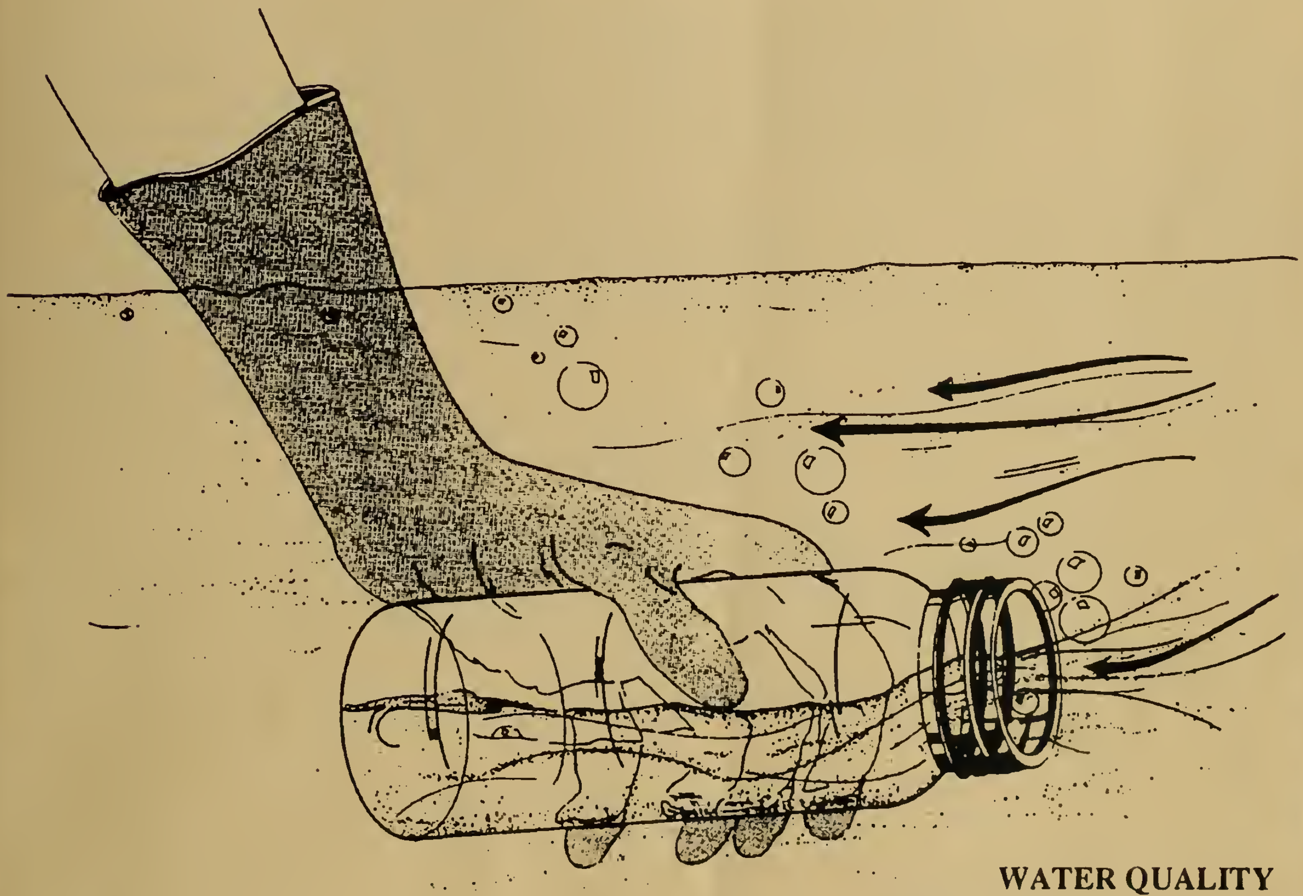
BLUESTONE NATIONAL SCENIC RIVER
AND
GAULEY RIVER NATIONAL RECREATION AREA



WATER QUALITY MONITORING PROGRAM

April - October 1992
Prepared by Robert James Sullivan

National Park Service
New River Gorge National River
Division of Resource Management
and Visitor Protection
Resource Management Section

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INTRODUCTION

This report presents the data from the 1992 fecal coliform study for the Gauley River National Recreation Area and Bluestone National Scenic River and is a continuation of the water quality studies conducted at New River Gorge National River (NERI) since 1980. Any visible trends between fecal coliform counts and stage level and/or 48 hour precipitation (48prcp.) will be discussed and recommendations for 1993 will be presented.

NERI was established by the United States Congress in 1978 and placed under management of the National Park Service (NPS), part of the United States Department of the Interior. A 62,000 acre corridor along 52 miles of New River was set aside ". . . to conserve and interpret the outstanding natural, scenic, and historic values and objects in and around the New River Gorge and preserve as a free-flowing stream an important segment of the New River in West Virginia for the benefit and enjoyment of future generations. . ." On October 26, 1988 the United States Congress approved Public Law 100-534. Title II, Section 201 of this act established the Gauley River National Recreation Area (GARI). Title III, Section 301 designated the Lower Bluestone as a Wild and Scenic River (BLUE). The purpose of the public law was "to protect and enhance the natural, scenic, cultural, and recreational values of certain segments of the New, Gauley, Meadow and Bluestone Rivers in West Virginia for the benefit of present and future generations, and for other purposes." Since this law was enacted, NERI has been in the process of developing and managing these two areas in accordance with their lawful designations.

Bluestone National Scenic River is a 10.5 mile stretch, in Summers and Mercer Counties, on the lower section of the Bluestone River. The Scenic River flows northeast through a forested corridor from the southern boundary of Pipestem State Park to one half mile upstream (south) of the Bluestone State Park Boundary (Figure 1). This downstream (northern) border corresponds with the summer pool elevation, 1410 feet above sea level, of Bluestone Lake (Reservoir). The upper (southern) 3.5 miles of the BLUE lie within the boundaries of Pipestem State Park; the last 7.0 miles lie within the Bluestone Public Hunting and Fishing area (Sprague 1991).

The headwaters of the Bluestone River begin above 3500′ on the north facing slope of East River Mountain, near Springville, Virginia. The river flows east and then north for 17 miles before entering West Virginia, west of Bluefield. The river then turns northeasterly for 60 miles where it joins the New River south of Hinton. On it's journey to the New River, the Bluestone cuts through the linear Appalachians and then, as it turns northeast, it follows the margin between the Allegheny Plateau and the folded Appalachians. At Eades Mill, West Virginia, the river begins to constrict in its gorge. The wall elevations vary from 300′ up to 1200′ (NPS, 1983a).

An early report of the lower section of the Bluestone River indicated satisfactory water quality (NPS, 1983a). It is also classified by the state as a high quality warm water stream, in relation to fisheries. Most water quality problems lie upstream, where the river runs through a wider floodplain, making it more susceptible to domestic and municipal sources of pollution. The river is affected slightly by strip mining activities that contribute acid mine drainage and siltation. Farming, construction, and exposed soils due to fire and logging, also contribute siltation loads to the river (NPS, 1983a).

The Gauley River National Recreation Area (GARI), a major segment of the Gauley River Basin, occupies the southeastern and south central portions of West Virginia. From its source on Gauley mountain in northwestern Pocahontas County, to its mouth in Fayette County, the Gauley River drains 1,422 square miles over a length of 107 miles.

GARI includes a 25 mile portion of the Gauley River between the Summersville Dam and Swiss (near its confluence with the New River), and a 5.5 mile portion of the Meadow River (Figure 2). The Gauley flows west-southwest, from an elevation of 1740 feet at the Summersville Dam, to 720 feet where the river leaves GARI at its western boundary. Dropping approximately 26 feet per mile through a gorge that averages 500 feet in depth, the Gauley River is noted for its outstanding whitewater and is recognized as one of the most technically demanding and popular commercially-run rivers in the nation. The Meadow River gradient averages 71 feet per mile and is considered runnable by only a handful of world-class kayakers.

The authorized area within the boundary includes approximately 10,300 acres and a large percentage of it is steep, second-growth forest, undeveloped, and held in large tracts by individuals or corporations primarily for coal or timber production. No NPS land acquisition has occurred to date.

The water quality for the Gauley River, as it flows through GARI, is considered to be good, with two exceptions. The Summersville Dam releases water from the lower half of Summersville Lake, releasing water at temperatures as low as 10°C and not exceeding 16°C. These low temperatures limit the quality of the warm water fisheries that used to occur in this area (EPA, 1981). A second degrading effect is the silt and sediment introduced by poor forestry and strip mining practices in the Gauley Watershed (NPS, 1983b). With the addition of both GARI and BLUE to the NPS administration in 1988, NERI staff decided to bring them in line with the fecal coliform bacteria studies being performed on the New River.

The following is a brief overview of the water quality studies conducted to date. In 1980, NERI began a water quality program on the New River to build baseline data upon which future monitoring and management activities could be based.

At that time, NERI lacked proper laboratory facilities to carry out the program, so it joined in a Cooperative Agreement with the West Virginia Division of Natural Resources (WVDNR). From 1980 to 1984 the WVDNR conducted water quality studies for NERI and to enhance its own water quality data baseline. These studies examined several parameters commonly related to commercial and domestic pollution, i.e., total aluminum, total cyanide, total iron, fecal coliform, etc. After examining the data from 1980-1984, NERI determined that sewage and/or animal wastes were a major cause for concern because of the large amount of human body contact on the New River. In 1985, NERI attempted to begin monitoring for fecal coliform, the accepted indicator for sewage and animal waste contamination (SM 901A.), with Colicount samplers (from Millipore Corporation). This method is quick and inexpensive, but it is not an EPA approved method. An unpublished report by NERI on the 1985 sampling effort recommended the use of an approved standard method and an approved laboratory for future bacteria monitoring efforts.

In 1986, based on these recommendations, NERI coordinated with the USDA Appalachian Soil and Water Research Lab Facilities to use their lab to analyze fecal coliform bacteria samples. The Membrane Filter Technique (SM909C), an EPA approved analytical method, was used with satisfactory results. In 1987, because of staff changes at NERI and inconsistency in the 1986 data, it was decided again to contract with the WVDNR to conduct fecal coliform studies on the New River and selected tributaries. The result of this agreement was the "New River Gorge National River Fecal Coliform Study, April-September, 1987-1988" done by WVDNR, once again to enhance its own water quality data baseline and to assist the NPS. In 1990, in an effort to train personnel and begin the establishment of an approved water quality lab, NERI staff took over the fecal coliform studies from WVDNR and again conducted the studies with assistance of the USDA lab in Beckley. Over the winter of 1990/91 much preparation was done for the debut of the 1991 fecal coliform study, performed by NERI staff in the newly equipped NERI Water Resources Lab. The 1991 study involved not only the New River, but also the Bluestone and the Gauley. A similar study was continued in 1992, with the addition of four new parameters. In future years, NERI plans to introduce at least 2 to 3 more parameters on these sites. Sampling will continue on a quarterly basis, and may expanded to a year around program. This expansion will require a substantial commitment of personnel and funding in order to carry out a more well balanced monitoring program.

MATERIALS AND METHODS

1. FECAL COLIFORM BACTERIA

The fecal coliform bacteria study was conducted in the Bluestone National Scenic River and the Gauley River National Recreation Area. The Bluestone River flows through Summers and Mercer Counties within the study area. All but one of the five sample sites are in the Scenic River Boundary. The one outside the BLUE boundary is 01M, Bluestone River near the southern boundary of Bluestone State Park. Gauley River, within the study area, flows through Nicholas and Fayette Counties. All of the sample sites for GARI are within the boundary. The sampling sites are listed in Table 1, and Figure 1 and Figure 2 show their relative locations. In Figure 1 and 2 and Table 1, "M" denotes mainstem sites while "T" indicates tributary sampling sites. The tributary sites were sampled as close to the main current as possible in order to give an adequate assessment of the waste load carried by each tributary.

The sampling sites were divided into two districts, BLUE and GARI. Each district was sampled on a biweekly basis, on alternate weeks. For example, if the BLUE district was sampled on the 1st and 3rd weeks of the month, the GARI district would be sampled on the 2nd and 4th weeks.

The time period of collection coincided with the summer recreational season for the two rivers, which is roughly April through September. The BLUE is subject to seasonal flows since it is not impounded by any upstream dams. Thus, the typical flow regime is high in the late winter and early spring (825 cfs), and low in late summer and early fall (40 cfs) (NPS, 1983a). Therefore, the Bluestone River is used by rafters more frequently and in larger numbers in early spring or during heavy rain events. It is also used far more often for canoeing and fishing all year long, and a few companies run guided fishing trips on the Bluestone River.

The Gauley River is unusual because the upper end lies at the foot of Summerville Dam. The river does not demonstrate the drastic flow regime of the BLUE. The river, in GARI, will run high in the spring if the spring runoff brings lake levels up, but the flow will only be about 1500-1800 cfs. This is minuscule compared to the record flow, since 1929, of 105,000 cfs (NPS, 1983b). In summer months the Gauley runs not lower than 200 cfs., usually somewhat higher, due to the constant dam control. Then, instead of being at its lowest (the record low since 1929 is 3 cfs.), it runs at 2500 to 3000 cfs during September and the first two weeks in October. The reason for these abnormally high flows is that the Corp of Engineers is lowering the level of Summersville Lake to make room for winter and spring runoff.

A second reason is that the rafting industry worked out an agreement with the Corps to have six four-day weekends, Friday through Monday, to have high enough flows to commercially raft the Gauley.

There are approximately 23 whitewater rafting companies that operate commercially during this period. In addition, the Gauley River attracts whitewater enthusiasts from around the World.

The river is also used for fishing, camping and other activities throughout the year. In summer the weekday pace is slow, but the weekends in September and the first part of October are crowded with rafters, kayakers, and canoeists. Occasionally, temporary high flows in the spring and summer will attract recreationists, but this use is small compared to the use by the Gauley Season crowds. Since BLUE and GARI recreational opportunities are largely based around the river, and most involve body contact, it was decided that fecal coliform bacteria would be the criteria to study, in addition to the 4 water chemistry parameters studied at NERI. All of the methods used for the "Bluestone National Scenic River and the Gauley River National Recreation Area: Fecal Coliform Bacteria Study, April-October, 1992" are found in Standard Methods for the Examination of Water and Wastewater: 17th Edition, (from here on referred to as SM).

As in previous years, the fecal coliform bacteria group was chosen as the parameter that best represents sewage and animal waste loads. The group itself does not consist of pathogenic organisms, but the presence of such bacteria is a good indication of pollution from disease-causing organisms usually associated with sewage and animal feces. Sampling bottles were 250ml and 500ml plastic Nalgene bottles. In order to bind any residual chlorine that may have been released into the streams, a dechlorinating agent was added to the sample bottles, as required SM 906 A.2. The bottles were then sterilized in an autoclave for at least 15 minutes at 127 degrees Celsius and placed in the drying cycle for another 15 minutes.

Water samples were collected, according to SM 906 A.3.e., on a biweekly basis. The sample bottles were then placed in a 24 quart cooler with ice and transported to the NERI lab. Analysis began within 6 hours, As required by SM 906 B.

Once in the laboratory, the samples were analyzed for fecal coliform bacteria based on procedures described in SM 909 C. The filtering apparatus was a Millipore OM 037 glass 47 mm filter holder. Commercially prepared M-FC media and sterile pads/filters (sterilized MSI cellulosic, white grid, 0,45 micron, 47mm., with pad) were used in the filtration. The sample filters were placed in disposable plastic petri dishes and heat sealed in a plastic bag.

The bags with sample filters were incubated for 24 + or - 2 hours at 44.5 + or - 0.2 degrees celsius. After incubation, the fecal coliform bacteria densities were calculated according to SM 909 C. 3 general formula:

$$\text{Fecal coliform bacteria colonies /100ml} = \frac{\text{Coliform colonies counted x 100}}{\text{ml sample filtered}}$$

The West Virginia Water Resources Board for Protection of Recreational Use and Public Water Supply (WVWRB) has set a standard of no more than 200 counts of fecal coliform bacteria per 100ml (WVDNR 1987-88) expressed as a geometric mean based on no less than five samples per month. The geometric mean can be calculated by one of two formulas:

$$GM = n\sqrt{[(FC1)\ (FC2)\ldots(FCn)]}$$

or

$$[\ \frac{(\log FC1)\ +\ (\log FC2\ +\ldots(FCn)\ ]}{n}$$

GM = monthly geometric mean

where GM = monthly geometric mean.

FC1, 2...n = fecal coliform bacteria value for sample number 1,2...n.

n = total number of samples during month (WVDNR 1987-88).

Due to fiscal restraints, only two samples were taken per month. Thus, the results must be considered a indicator of streams that may have exceeded the above standard. Interpretation of the results of the 1992 BLUE and GARI study has been based primarily on whether a stream met, or failed to meet, this criterion (NPS 1990, 1991).

When the samples were taken, date and time were noted, as well as 8 other parameters (see Appendix A-1). The parameters are water temperature, air temperature, pH, stage level (where applicable). In the absent of a staff gage a visual level was recorded (high, normal, low). Other parameters include, turbidity (water condition), dissolved oxygen, weather, and conductivity. Water temperature and conductivity were determined with a YSI model 33 conductivity meter. The dissolved oxygen was determined with a YSI model 51B dissolved oxygen meter. An alcohol thermometer was used to determine air temperature. To detected pH a Fisher portable pH-temperature compensating meter was used. Turbidity was determined with an Hach model 16800 turbidity meter (unit of measure NTU). It also was subjectively determined by use of a written scale, along with weather of the day as illustrated in Appendix 2.

All equipment was calibrated prior to each sampling run as per instructions provided by the manufacturer. The stage level and 48 precipitation for the BLUE was obtained from the recorded phone message at Bluestone Dam. Gauge phone numbers and information are listed in appendix 3.

The stage level and 48hr prcp for the GARI sites was obtained from the personnel at Summersville Dam. The same information for the BLUE was gathered from the Bluestone Dam personnel.

2. METALS

Parameters sampled under the baseline water quality monitoring strategy, included, total iron (Fe), aluminum (Al), manganese (Mn), and alkalinity as well as the other 8 listed earlier. Future additional parameters which that being considered are total dissolved solids (TDS) and hot acidity. Total iron was tested according to procedures in the Handbook for Water and Waste Water Analysis: Digestion and selected methods for the determination of metals and minerals (Hach 1991). All figures for total iron were derived from this method and were followed without deviation. Total iron was the only metal that was digested before measurement. Once digestion was completed (procedure for liquids, pg. 30-33), total iron was measured by following the steps under the total iron section, pg. 81-82. The sample volume of 20ml was determined by following the chart in the total iron section, pg. 81. Aluminum was tested according to procedures in the DR/3000 Spectrophotometer Manual, (Hach 1990). Procedure code A.3 for a range of zero to 0.250 mg/L (Eriochrome Cyanine R Method) was followed without deviation. Samples were run within hours, so they were not preserved with nitric acid. A .100 mg/L aluminum standard solution was prepared according to note C in the DR/3000 Manual for the accuracy check, which yielded acceptable results. Manganese was also tested according to the procedures in the DR/3000 Spectrophotometer Manual. Procedure code M.2 (P.A.N. Method) for low range (0 to .800 mg/L) was followed without deviation. Samples were not digested before testing. The accuracy check was preformed as indicated in Water Analysis Handbook. (Hach 1989, pg. 365). Alkalinity was tested according to procedures in Digital Titrator Model 16900-01 Manual (Hach 1988, pg. 34). Sulfuric acid titration cartridges of .1600 and 1.600 concentration were used. Phenolphthalein alkalinity was zero for all samples, and they were generally titrated to a 4.8 pH end point. The standard additions method was used for an accuracy check on the samples and yielded acceptable results.

All samples were single grabs from one point at each sampling site, near the mouth. Each of the streams sampled appeared to be well mixed both vertically and horizontally. Even though single point sampling is quite limited in its ability to clearly characterize entire watersheds, it nonetheless can support some inferences about the upper watersheds as long as additional knowledge of the

activity within each watershed is available. However, one cannot assume that the water quality at one sampling point adequately represents the quality at all other points.

When samples were taken, date and time were recorded, as well as the 8 parameters discussed earlier. The samples were collected by hand, either by dipping the sample bottles directly in the water or by drawing samples in a stainless steel bucket and pouring into the bottles. In either case, all collection equipment used was rinsed with sample water before the sample was taken. Samples were collected in a manner approved by the United States Environmental Protection Agency (EPA). Since analysis had begun within 1 to 2 hours after collection, following EPA guidelines to preserve the sample was not necessary. Due to fiscal and personnel constraints, only the first two quarters of testing was completed. Interpretation of this data, is therefore, limited in scope.

RESULTS AND DISCUSSION

The concentration of fecal coliform bacteria was examined for 5 sites on the BLUE and 4 sites on the GARI. In the BLUE, 3 sites are on the Bluestone River, one site is on the Little Bluestone River, and the last site is on Mountain Creek. In the GARI three sites are on the Gauley River and one site is on Peter's Creek. The following section presents the results of these examinations, along with a discussion of violations, in relation to the 48 hour precipitation (48prcp) and water level.

Occasionally throughout the report, flow levels are referred to as high, normal or low. These categories are based upon the opinion of the sampler rather than on quantifiable data. While subjective, this opinion is nonetheless drawn from several years of familiarity with the streams in this study. For the purpose of this report, a subjectively derived flow will suffice in discussing the results where actual flow measurements were not available.

Also, it must be understood that use of the term "violation" is relative in this report. The standard for fecal coliform bacteria is no more than 200 fecal coliform colonies per 100 milliliters of sample. This will be reported as MFC/100ml, which stands for Membrane Filter Count per 100 milliliters of sample. This part of the standard is legally valid in the context of 5 separate samples per month. If the geometric mean of the 5 samples exceeds 200/100ml, then the sample site is considered to be in violation of the standard.

The second part of the standard states that if more than 10% of the samples exceed 400/100ml, then the sample site is also in violation. Since sampling was performed 2 times per month, the standard cannot be legally applied to the results presented here. However, for this study, a reading of 200/100ml or more will be used to point out bodies of water that may be in violation of the

standard.

Each site has a corresponding figure that displays the MFC's for that site in 1992 (Figures 3-11). Appendices 4 and 5 correspond with figures 3-10. Appendices 6 and 7 consist of the raw data and comments arranged by site and date. Appendix 8 - 11 contains the raw data for Al, Fe, Mn, and Alkalinity for the sites tested.

The Bluestone National Scenic River Results and Discussion

Flows of the Bluestone and Little Bluestone rivers demonstrate the characteristics of unimpounded, free flowing streams. In the spring, they had high flow due to increased runoff, proceeded by lower levels in late summer and early fall. These flow patterns have been linked to high fecal coliform bacteria (FC) levels, with typically elevated levels occurring during high spring flows and diminished levels during lower summer/fall flows (NPS 87-88, 90-91).

Although stage level was reported as high for the first two dates on the main stem sites, the investigator recorded observations that indicated that the flows and 48prcp on 5/18, 6/11, 6/25 were abnormally high in comparison with the rest of the season. From this point on, the general trend was for the FC readings to decrease as the season progressed.

01-M, Bluestone River near Bluestone State Park (Figure 4)

This site is four-tenths of one mile upstream of the Bluestone State Park boundary. This puts it very close to, but not inside, the boundary of the BLUE. The site is in a riffle on a bend in the river. At this point the river is only accessible by foot and no dwellings are in view. This section of river is in a pristine gorge with a trail running along the river (an old road bed). The major activities in this area are hunting, fishing and boating. Most, if any, developments that exist in the watershed are located 800 to 1000 feet above the river level. It is believed that most of the fecal coliform bacteria for this site come from the many tributaries of the Bluestone River and upstream of its watershed.

Although this sample site had no readings above 200/100ml, the mean was slightly higher than the other mainstem sites. The highest readings were 133/100ml on 5/16, 156/100ml on 6/11, and 75/100ml on 6/25. When the other samples were taken on the bi-weekly schedule, the readings were below 38/100ml, and as the season progressed, a clear trend of lower readings during low flow can be seen. The above three dates proved to have the highest fecal coliform bacteria readings for the sample sites of Bluestone River in 1992.

One likely explanation for the overall increase in the bacteria at this site is the influence of the other tributaries in the upper reaches of the watershed, particularly the Little Bluestone. All

the other sample sites showed increased rain fall and stage level, thus increased fecal coliform bacteria, on the same days this site demonstrated the highest readings for the Bluestone River mainstem.

02-T, Little Bluestone River (Figure 3)

The Little Bluestone River is the major tributary in the BLUE, entering the Bluestone River about 8 miles downstream of the southern boundary of the BLUE. The Little Bluestone watershed drains in from the west, from a rural, low density housing area. In some areas where the stream plane is wide enough, the river runs through pasture land and near several houses along the margin of the stream. These are two possible sources for the waste load present in this river.

At this site two readings of 231/100ml, on 5/18, and 1253/100ml, on 6/25, were above the standard. One other reading of 156/100ml on 6/11 was near the standard. The rest of the samples fell below 124/100ml and the lowest reading was 4/100ml on 4/13.

Once again seasonal trends of high flow, higher fecal coliform bacteria and low flow, lower fecal coliform bacteria, are clear in Figure 3. The abnormally high reading of 1253/100ml on 6/25 is most likely due to a intense local front the passed through the area. It was observed on that sampling date that Suck Creek, a tributary of Little Bluestone, was flowing high under extremely turbid conditions. The intense rainfall of the local area and the contribution of Suck Creek are the likely elements that gave rise to the sudden and odd peak of fecal coliform bacteria observed on 6/25.

03-M, Bluestone River Near Confluence (Figure 6)

This site is located about two thirds of the way downstream from the southern boundary of the BLUE. The sample was taken form a ledge in a deep pool with slow moving water. The gorge at this site is narrow, about 800′ deep, and heavily forested. On top there are farms and pastures, with moderate size herds of cattle.

This site did not have any readings above the 200/100ml standard. The highest readings were 117/100ml on 5/18, 168/100ml on 6/11, 70/100ml on 6/25 which corresponds with the high readings for all the other sites. The rest fell below 58/100ml with six below 21/100ml. As indicated earlier, the elevated readings corresponds with spring and early summer heavy rain fall which increased runoff in the water shed. This runoff carries the waste loads on the pastures and forest lands, into the stream, causing the fecal coliform levels to increase as figure 6 displays.

04-M, Bluestone River at Pipestem State Park (Figure 5)

This site is located on river left just downstream of the Pipestem

Lodge. At this point the gorge is narrow, deep, and heavily forested.

The sample site is located above a small riffle near the middle of the river. On the west side, at the edge of the gorge are a few scattered farms. These farms are a possible contribution to the natural waste loads that run off the surrounding area.

This site didn't have any readings above the 200/100ml standard. The three highest readings of were 150/100ml on 5/18, 180/100ml on 6/11, and 75/100ml on 6/25. It seems the higher flows from upstream contributed to elevated fecal coliform bacteria levels. Once again the relationship between stage levels and rain fall are clear as figure 5 shows, it also shows the elevated readings coincide with the high readings of the other sites of BLUE.

05-T, Mountain Creek at Pipestem State Park (Figure 7)

This site is located 2.5 miles Southeast of Dunn, just within the BLUE boundary, where the trail starts to cut away from Mountain Creek. This creek drains a fairly large area with several smaller creeks contributing to its flow. The whole drainage consists of mostly pasture land, that supports a moderate population of grazing cattle, and a few sparsely scattered dwellings.

No past data was available for this site, since it was determined that this was the first time that sampling has occurred on this creek.

This site had an elevated reading of 124/100ml on 5/18 and two readings that were above 200/100ml. These occurred on 6/11, a reading of 230/100ml and on 6/25, a reading of 344/100ml. Figure 7 indicates that the rainfall curve and the fecal coliform bacteria counts do not quit coincide. The 6/25 count maybe due to a local heavy rainfall event, probably the same one that affected Suck Creek and the Little Bluestone on the same date.

One other thing that did stand out is the pH reading of 10.8 on 5/18. The usual trend is for pH readings to be lower in spring partly due to the cold water temperatures, and to increase as the seasonal temperatures increase. With the increased runoff in the spring the water stirs up certain elements that can increase the pH. However a more likely reason for this sudden increase of pH is the pasture land adjacent to the creek. A common agricultural practice is to lime pastures in spring.

This first year of data Mountain Creek appears to demonstrate seasonal trends that are common to the other sites discussed above, i.e., elevated bacteria counts in spring with increased rainfall and higher flows and decreased fecal coliform bacteria as the water subsides. It is difficult to make concrete conclusions from this data, since this is the first time that any data has been

collected. The 1993 data will provide a broader base on which to identify trends in water quality bacteria.

For the BLUE the elevated (or above 200/100ml) fecal coliform bacteria counts occurred on 5/18, 6/11, 6/25. As the season progressed and the river and stream flow subsided, the bacteria levels noticeably decreased. Only two sites had readings above the 200/100ml standard, these were 02-T on two occasions and 05-T on two occasions. The Bluestone River itself had no readings above the standard; the highest count on the river was below the tramway in Pipestem, 04-M. The gorge in the BLUE is primarily a pristine, steep walled gorge. The top of the gorge, on the flat plateau-like areas, is the only developed area. Human dwellings, as well as small farms are scattered along the gorge top. These areas of dwellings and pastures are probably some of the main contributors to the fecal coliform bacteria levels found here.

A several miles upstream on the Little Bluestone, the river floodplain is large enough for a few farms and domestic dwellings. It is probable that runoff from agricultural sources, as well as some domestic source additions, caused the elevated spring readings. Increased precipitation in the spring may also have been a factor in increasing the natural supply of bacteria into the watershed.

The Gauley River Recreation Area Results and Discussion

The flow on the Gauley, in GARI, is regulated by the Summersville Dam. This regulation allows the water to flow more consistently throughout the year. The typical high spring flows and summer flows are not exhibited on this stretch of river. In the spring, the flow is higher because of the excess runoff, but the regulated peak flow is nowhere near what the natural peak flow would have been. In the fall, the flow is much higher than normal, especially during Gauley Season.

01-M, Gauley River at Summersville Dam (Figure 8)

This site is below the dam on river right. It is a flat bedrock ledge used as a boating and fishing access. During the Gauley season this is an especially turbulent eddy area. Once again this site exhibited the best water quality, for fecal coliform bacteria, of any site tested by the NERI staff. All the readings taken were below 6/100ml with one exception, which was 12/100ml.

The water at this site is flowing out of Summersville Lake. The reservoir, with its large volume, acts as a basin to catch sediments and dilutes the effects of any toxic materials, i.e., Fe, Al, Mn, Alkalinity, that may be introduced from upstream. The long retention time of the water in the reservoir can cause lower counts because of a die off of the fecal coliform bacteria. Thus, the readings taken of the water flowing out of the dam reflect the dilution of any fecal coliform bacteria present and reduction due

to the long holding time. Figure 8 shows the relation of stream level (discharge) and fecal coliform bacteria. Although the readings were never high, the bacteria levels undoubtedly increased as stream level increased.

02-M, Gauley River at NARR Campsite (Figure 9)

This site is about one third of the way upstream from the western boundary on GARI, just upstream of the mouth of Peter's Creek. In this area the gorge walls are heavily forested and approximately 600' in height. There are no permanent dwellings near this area.

This site shows a slight increase in fecal coliform bacteria levels compared to 01-M, yet the levels are still lower than most sites and noticeably lower compared to 1991 data for the same time. No reading were above 200/100ml; the highest for this site was only 20/100ml on 7/27. The pH reading on 9/14 of 6.3 appeared as a sudden drop compared to previous readings. However, since the conductivity and alkalinity remained consistent throughout, the sample period, there was no reason for concern. The 48 hour precipitation and stream flow did seem to influence the fecal levels at this site. Figure 9 shows the correlation between fecal coliform bacteria levels and high 48prcp.

03-T, Peter's Creek near mouth (Figure 10)

Peter's Creek is the second largest tributary to enter the Gauley in GARI. It drains a remote, rural area characterized by scattered domestic dwellings, strip mining and timbering. Peter's Creek is 17.5 miles long and has a very steep gradient, of 57 feet per mile. The watershed begins near Summersville, in Nicholas County. The only communities of any size are the unincorporated towns of Lockwood, Gilboa, and Zela.

Peter's Creek is greatly affected by mining and timber activity within its basin. The area has been timbered in the recent past, but coal mining is by far the principal industry. For every sample taken, this site exhibited milky, murky or turbid conditions even during low flows and 48 prcp conditions. On three occasions, this site exhibited turbid conditions, with two readings of >100 NTU. This is indicative of exposed soils eroding into the creek. It is obvious that there are negative contributions being made by the above industries to this watershed.

The limited data available for Al, Fe, and Mn, indicates that they were relatively low. The higher pH, conductivity and alkalinity at Peter's Creek would indicate material is being added to mask any acid mine occurring that may be draining in the watershed.

This site had three samples above the standard, three less than the 1991 data. These occurred on 6/15-1200/100ml, 7/16-233/100ml, 7/27-1867/100ml. This creek exhibited higher readings in the

spring and early summer months when the creek was high due to runoff, as one might expect.

The fecal coliform bacteria data was down compared to 1991, with 10 out of 13 being below 200/100ml, yet the data does show a continuing problem with elevated fecal coliform bacteria. The number of high readings, during both high and normal flows, and at both high rainfall and zero rainfall, would seem to support the possibility of the problem being point sources. A continued influx of domestic waste from dwellings might cause these levels to be consistently elevated. In Figure 10 rainfall levels correlate with higher bacteria counts. More research will need to be completed in order to make any definite conclusions for the problems at this site.

04-M, Gauley River at South Side Swiss (Figure 11)

This site is on river right upstream of Swiss. At this point the gorge widens and the walls are over 1000′ in elevation. The gradient for the river lessens significantly and there is a level floodplain on each side of the river. Laurel Creek is just below the sample site.

This site had just one violation in this sampling year, 244/100ml on 7/27 after a 48prcp of 1.66 inches. On 6/15 there was an elevated count of 195/100ml after a 48prcp of just 0.12 but the mainstem was very high and murky which would indicate steady rainfall over many days. At this site a relationship of fecal coliform bacteria and rainfall can be observed. No definite conclusions can be made with this narrow scope of data, but it would seem to indicate that this site and the other mainstem sites are in pretty good condition in relation to fecal coliform.

The overall picture for the three mainstem sites in GARI seem to indicate that the animal/human waste levels are within acceptable levels. The metals test in this report and their outcome are inconclusive. Like most reservoirs, Summerville Lake is acting as a basin to catch sediment and dilutes the effect of fecal coliform bacteria and any toxins that may be introduced from upstream. The conductivity measurements for this study and previous studies (WVDNR, 1990) indicate that the Gauley River is a rather low alkalinity river.

The trouble spot in GARI is Peter′s Creek, which exhibits problems with fecal coliform bacteria and turbidity. The problem with fecal coliform bacteria lies in the fact that high fecal levels are often indicative of other organisms that are potentially harmful to humans and other aquatic organisms. The high turbidity readings indicates that there are continual disturbances in this watershed that need to be addressed.

SUMMARY

Much study is needed in GARI and BLUE in order to gain a better understanding of the seasonal trends and both point and non-point sources of pollution. In 1993, the four sites sampled in GARI should be continued and expanded to include baseline metals analyses on a quarterly basis. The upstream site is a valuable control for water flowing into the Gauley River and the downstream site is good for comparison. Peter's Creek was the only site to exhibit readings above the standard. This site needs continued monitoring to fully assess its water quality condition. It exhibited milky, murky and extremely turbid conditions each time it was sampled, as well as elevated bacteria levels. The Meadow River is a significant tributary entering the Gauley River system. The problem with sampling this area is that the tributary is difficult to reach and the 1 or 2 accesses are both private. Once permission is obtained, a likely site would be just downstream of the U.S. Highway 19 bridge.

The BLUE contains limited tributaries to be studied, therefore, further monitoring on the present sites should be continued, with the addition of baseline metals sampling on a quarterly basis. The site on the Little Bluestone should be maintained in order to compile several years worth of baseline data for this large tributary. Since it is the main tributary in BLUE, a longer record of results is needed to be confident of conclusions and recommendations about the water quality. The sites at the upper and lower park boundary in BLUE should continue to be sampled to maintain a source of data that would indicate waste loading and river conditions as the Bluestone River enters and exits the park. Continuous sampling should also be maintained on Mountain Creek, the second largest tributary in BLUE. As with GARI, the sample sites for the BLUE will remain relatively unchanged. However, sampling will be expanded to a year-round protocol in order to establish concrete baseline data.

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TABLE 1.

Bluestone National Scenic River
and
Gauley River National Recreation Area
Fecal Coliform Bacteria Sampling Site Locations

Map Code (Figure 1.)	Station Location
	Bluestone National Scenic River
01-M	Bluestone River above Bluestone State Park
02-T	Little Bluestone River near the mouth
03-M	Bluestone River above Little Bluestone Confluence
04-M	Bluestone River at Pipestem State Park
05-T	Mountain Creek
(Figure 2.)	
	Gauley River National Recreation Area
01-M	Gauley River at Summersville Dam
02-M	Mid Gauley upstream of the mouth of Peter's Creek
03-T	Peter's Creek near mouth
04-M	Gauley River at South Side Swiss Upper Swiss)

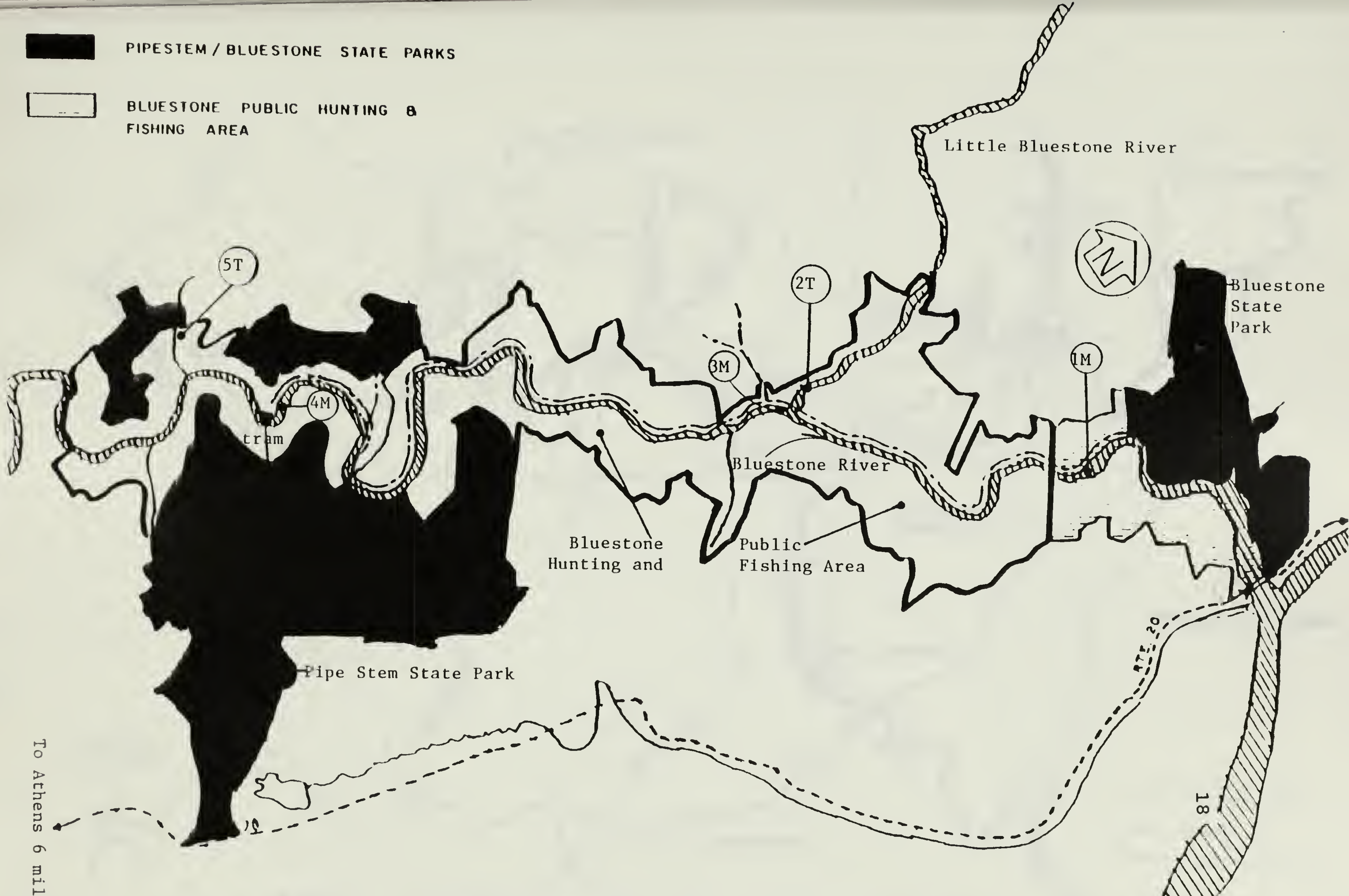


FIGURE 1. BLUESTONE NATIONAL SCENIC RIVER STUDY AREA

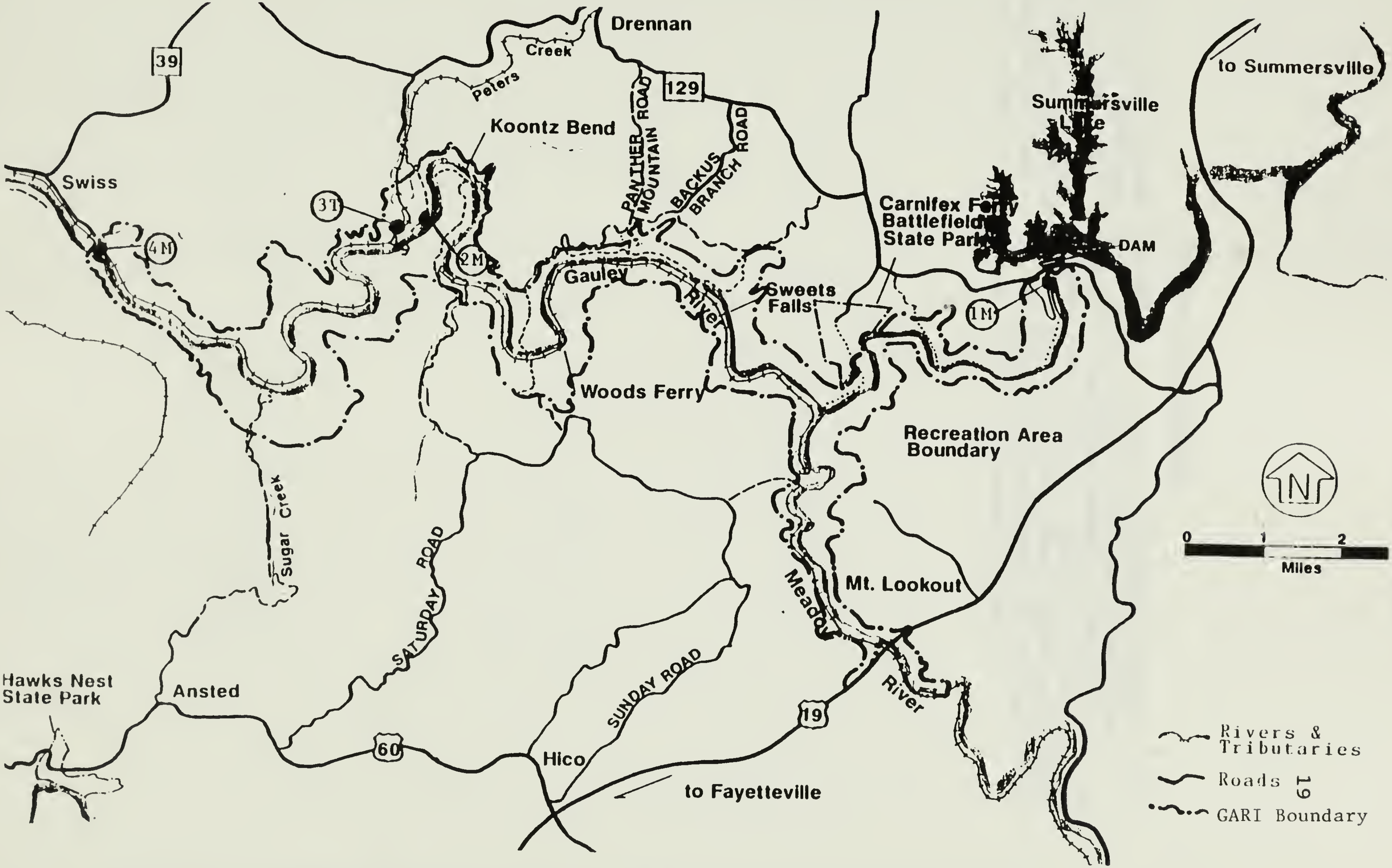


FIGURE 2. SAMPLING AREA FOR GAULEY RIVER NATIONAL RECREATION AREA

GAULEY RIVER NATIONAL RECREATION AREA

FIGURES EXPLANATION

The following figures represent the fecal coliform bacteria data for the 1992 BLUE and GARI water quality monitoring program. It should be noted that each chart should be looked at separately, as the vertical **"y"** axis changes from chart to chart, so the figures cannot be compared directly. Also note that the stream level unit is in tenths of feet. The rainfall is the amount of precipitation that fell within a 48 hour prior to the sampling date.

Figure 3. Fecal Coliform Data for the Little Bluestone River

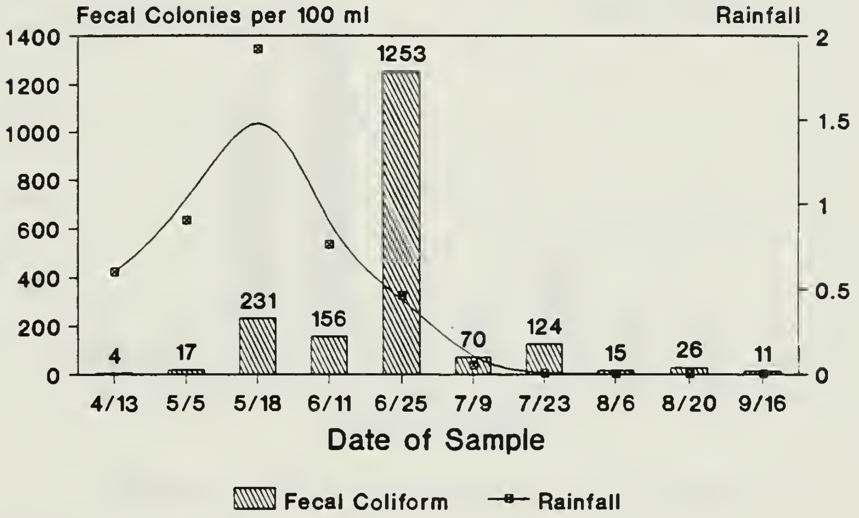


Figure 4. Fecal Coliform Data for the Bluestone River at Bluestone State Park

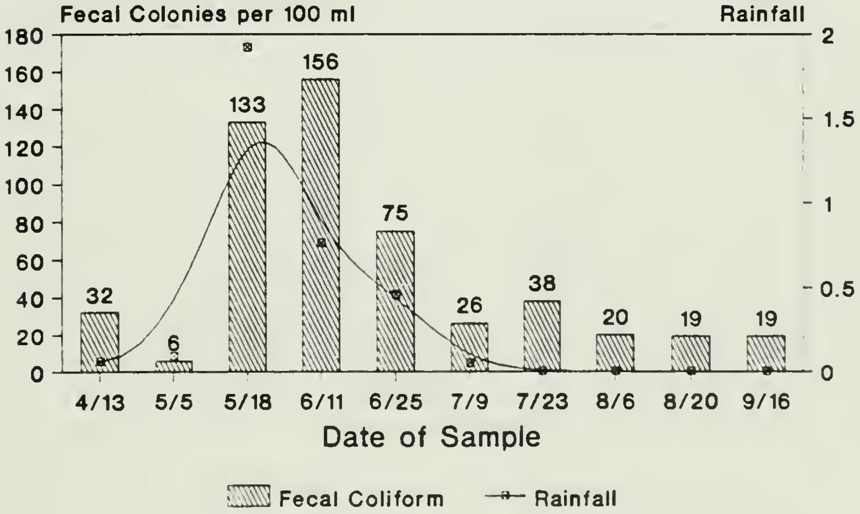
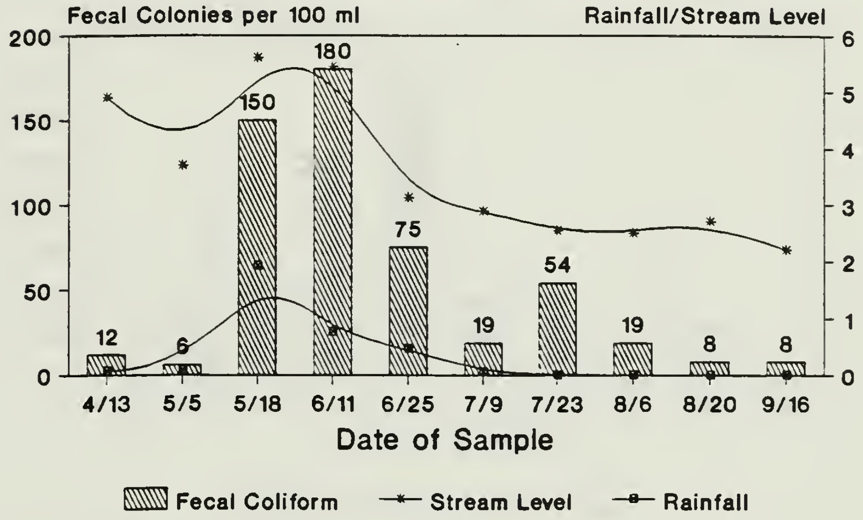
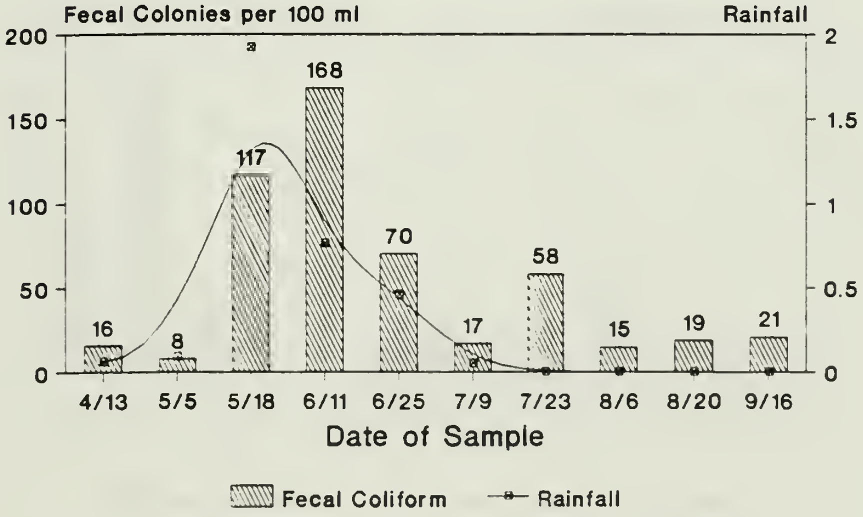


Figure 5. Fecal Coliform Data for the Bluestone River at Pipestem State Park



Site was downstream of the Tramway.

Figure 6. Fecal Coliform Data for Bluestone River Confluence



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[illegible]

Figure 7. Fecal Coliform Data for the Mountain Creek Near Pipestem St Park

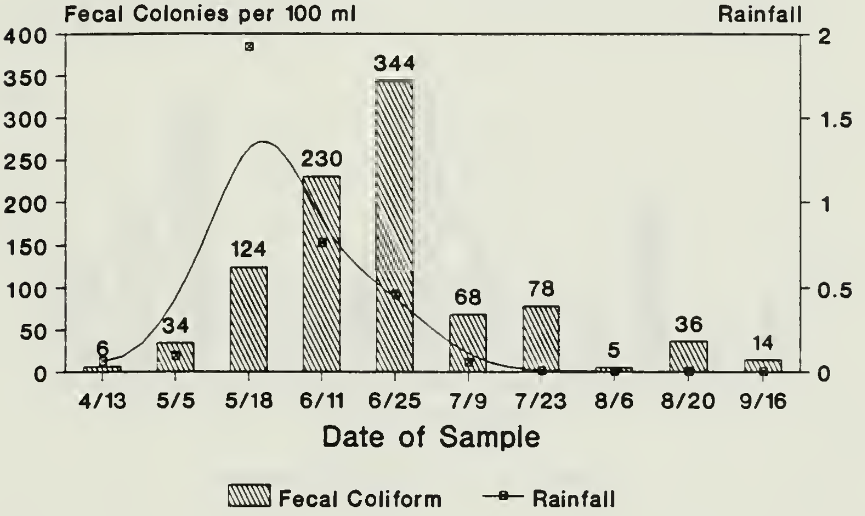
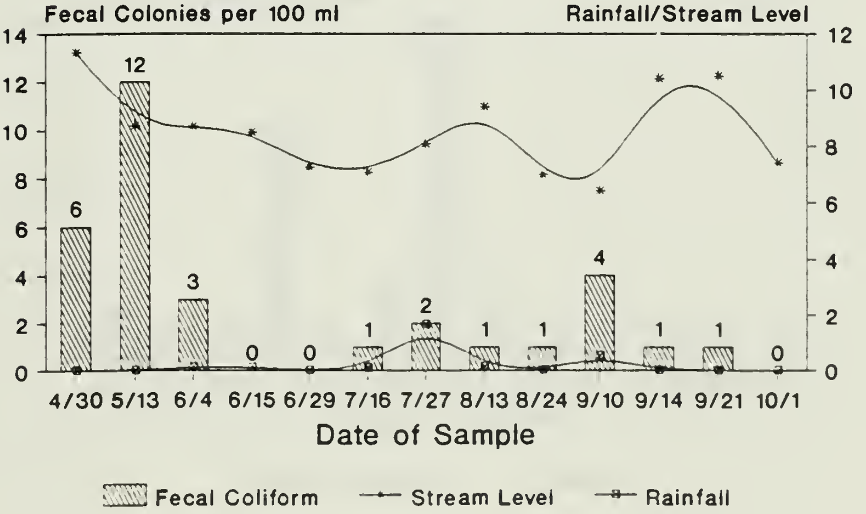


Figure 8. Fecal Coliform Data for the Gauley River at Summersville Dam



At main boaters put in.

Figure 9. Fecal Coliform Data for the Gauley River at NARR Campsite

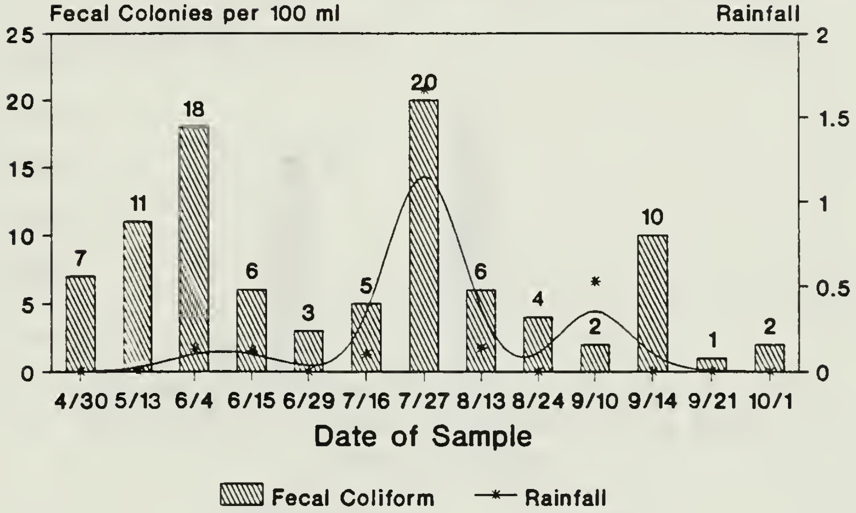


Figure 10. Fecal Coliform Data for Peter's Creek Near Mouth

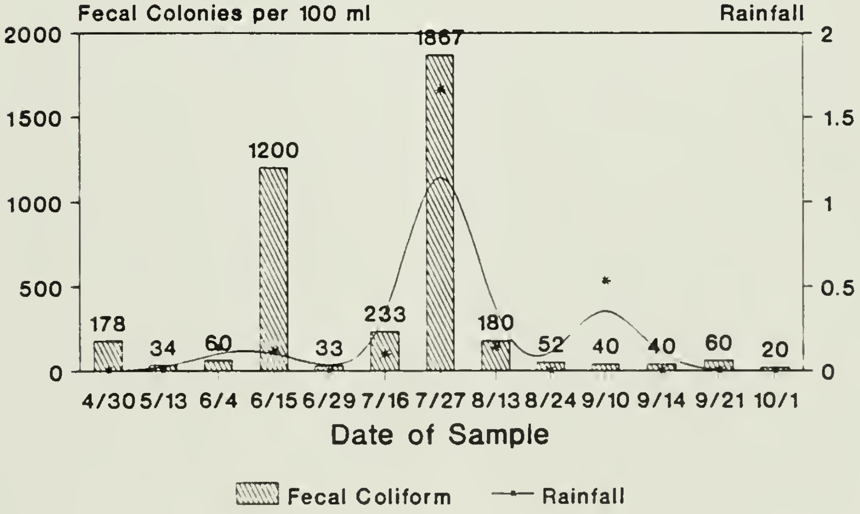


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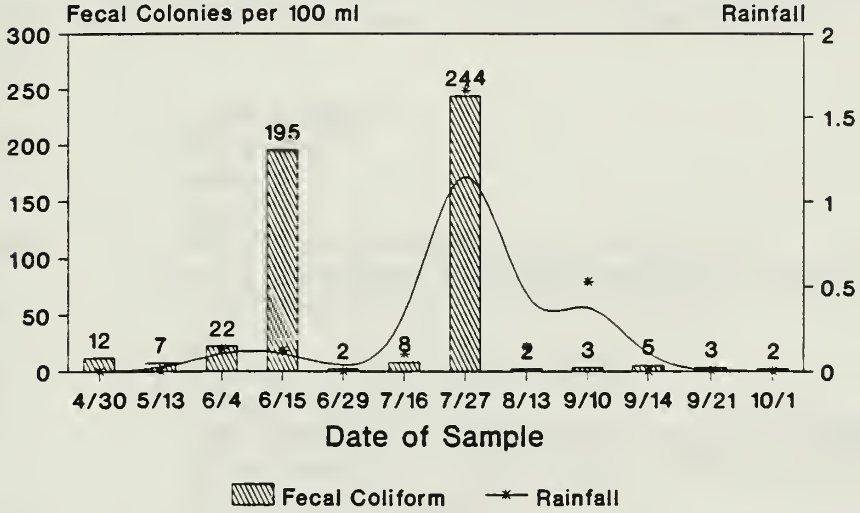
Figure 11. Fecal Coliform Data for the Gauley River at South Side Swiss



Take out at Mr. & Mrs. Kootnz

APPENDICES

This section contains the appendices referred to in the paper. In Appendix 7 and 8 the 0.0 values for dissolved oxygen are not accurate. The data base program printed zeros in place of blank spaces. The 0.0 represent periods when the DO meter was being serviced. The following is a key to the abbreviations used in Appendix 6 - 9.

SITE_NO	Site Number
SITE_NAME	Site Name
DATE	Date
TIME	Time
WATER_TEMP	Water Temperature (in celsius)
F_100ML	Fecal coliform colonies per 100 mls of sample
AIR_TEMP	Air Temperature (in celsius)
PH	pH
STRM_LVL	Stream level/Stage level
H20_COND	Water condition
INCUB	The amount of time the fecal coliform colonies were incubated in the hot water bath
D_O	Dissolved oxygen
DILUTIONS	The dilutions used to get the accepted fecal coliform bacteria colony reading (20 - 60)
WEATHER	Weather (referred to in appendix - 2)
CONDUCT	Conductivity
PRECIP_48	Precipitation in the 48 hour period preceding the date listed

APPENDIX 1. SAMPLE DATA COLLECTION FORM

Sample Site	Date	Sample Time	H2O Temp	Air Temp	pH	Stage Level	H2O CND Trbidty	DO	Weather	Conduc tivity	Dilution		Fecals /100ml	Comments
01.BLUE STONE ST.PARK	8/6/92	9:50	22°c	20°c	8.6	2.35'	N, M 2.8 NTU	8.2	OVC	285	100 12	150 30	20	
2.LITTLE BLUE STONE	8/6/92	11:04	18°c	20°c	8.1		N. SL 1.1 NTU	6.5	OVC	100	50 9	100 15	EST. 15	
03.CON-FLUENCE	8/6/92	11:36	21°c	21°c	8.4	2.35'	N, SL NTU	1.2	OVC	210	100 17	150 23	15.33	
05.MT. CREEK Tribu.	8/6/92	12:29	17°c	19°c	8.0		N, M 0.7 NTU	8.7	OVC	175	75 4	125 1	EST 5.33	
04.PIPE STEM ST.PARK	8/6/92	12:57	21°c	21°c	8.7	2.35'	N, M 2.5 NTU	8.7	OVC	291	125 24	175 18	19.2	

Stage Level	8/6 2.35' 71 CFS	
Precip W/IN 48 Hours	8/6 0.00"	

BLUESTONE DAM PRECP. (LIVE PERSON) 1-466-1234
BLUESTONE RIVER STAGE (RECORDING) 1-466-0156
Other Observations and Comments:

CONTROL BEFORE: OK OK
CONTROL AFTER: OK OK

Time In: 4:03 8/6
Time Out: 4:00 8/7

Time In:
Time Out:

APPENDIX 2. WEATHER CODE CHART

This chart was used to determine weather codes when sampling.

WEATHER CODES

I. CLOUD AMOUNT

CLR	CLEAR: LESS THAN 1% SKY COVER
SCT	SCATTERED: 1% TO 50% SKY COVER
BKN	BROKEN: 60% TO 90% SKY COVER
OVC	OVERCAST: MORE THAN 90% SKY COVER
-	THIN (WHEN PREFIXED TO THE ABOVE SYMBOLS)
-X	PARTIAL OBSCURATION: 1% TO LESS THAN 10% SKY HIDDEN BY PRECIPITATION OR OBSTRUCTION TO VISION
X	OBSCURATION: 10% SKY HIDDEN BY PRECIPITATION OR OBSTRUCTION TO VISION

II. PHYSICAL WEATHER:

A. WEATHER AND OBSTRUCTION TO VISION SYMBOLS

A	HAIL
BS	BLOWING SNOW
D	DUST
F	FOG
GF	GROUND FOG
H	HAZE
K	SMOKE
L	DRIZZLE
R	RAIN
RW	RAIN SHOWERS
S	SNOW
SW	SNOW SHOWERS
T	THUNDERSTORMS
T+	SEVERE THUNDERSTORMS
ZL	FREEZING DRIZZLE
ZR	FREEZING RAIN

B. PRECIPITATION INTENSITIES

(-) LIGHT
(NO SIGN) MODERATE
(+) HEAVY

Stream Conditions

First letter (volume):

L = low
N = normal
H = high

Second letter(s) (velocity):

SL = slow
M = moderate
SW = swift

Third letter(s) (opacity):

C = clear
MI = milky
MR = murky

APPENDIX 3. STAGE LEVEL TELEPHONE NUMBERS

The following is a list of non-battery operated gauges for several area rivers. The WVWA answering service will carry levels of selected rivers when they are at paddling levels.

PHONE	**RIVERS**	**COMMENTS**
466-0156	New (Bluestone Dam release)	Updated 8:00 AM each day.
529- 5127	GAULEY & NEW Watersheds	Updated 10:00 AM each day.

(Stage, flow & 24-hour change on all gauging stations on Bluestone, Greenbrier, Cranberry, Elk & Meadow, plus Gauley & New.)

APPENDIX 4. FECAL COLIFORM BACTERIA VALUES FOR BLUESTONE NATIONAL SCENIC RIVER

ite No.	Site Name	Date	FC/100ml	Level	Precip
1M	BLUESTONE ST. PARK	04/13/92	32	4.90	0.06 30
1M	BLUESTONE ST. PARK	05/05/92	6	5.10	0.09
1M	BLUESTONE ST. PARK	05/18/92 e	133	5.60	1.92
1M	BLUESTONE ST. PARK	06/11/92	156	5.70	0.76
1M	BLUESTONE ST. PARK	06/25/92 e	75	NORM	0.46
1M	BLUESTONE ST. PARK	07/09/92 e	26	2.60	0.05
1M	BLUESTONE ST. PARK	07/23/92	38	2.20	TRACE
1M	BLUESTONE ST. PARK	08/06/92	20	2.35	0.00
1M	BLUESTONE ST. PARK	08/20/92	19	2.00	0.00
1M	BLUESTONE ST. PARK	09/16/92	19	1.90	0.00
2T	LITTLE BLUESTONE	04/13/92	4	HIGH	0.60
2T	LITTLE BLUESTONE	05/05/92	17	HIGH	0.90
2T	LITTLE BLUESTONE	05/18/92 e	*231	HIGH	1.92
2T	LITTLE BLUESTONE	06/11/92	156	NORM	0.76
2T	LITTLE BLUESTONE	06/25/92 e	*1253	NORM	0.46
2T	LITTLE BLUESTONE	07/09/92	70	NORM	0.05
2T	LITTLE BLUESTONE	07/23/92	124	NORM	TRACE
2T	LITTLE BLUESTONE	08/06/92	15	NORM	0.00
2T	LITTLE BLUESTONE	08/20/92 e	26	NORM	0.00
2T	LITTLE BLUESTONE	09/16/92 e	11	LOW	0.00
3M	CONFLUENCE	04/13/92 e	16	HIGH	0.06
3M	CONFLUENCE	05/05/92 e	8	NORM	0.09
3M	CONFLUENCE	05/18/92 e	117	NORM	1.92
3M	CONFLUENCE	06/11/92	168	HIGH	0.76
3M	CONFLUENCE	06/25/92	70	NORM	0.46
3M	CONFLUENCE	07/09/92 e	17	NORM	0.05
3M	CONFLUENCE	07/23/92	58	NORM	TRACE
3M	CONFLUENCE	08/06/92 e	15	NORM	0.00
3M	CONFLUENCE	08/20/92	19	NORM	0.00
3M	CONFLUENCE	09/16/92	21	HIGH	0.00
M	PIPESTEM ST. PARK	04/13/92 e	12	4.9	0.06
M	PIPESTEM ST. PARK	05/05/92 e	6	HIGH	0.09
M	PIPESTEM ST. PARK	05/18/92 e	150	5.6	1.92
M	PIPESTEM ST. PARK	06/11/92	180	HIGH	0.76
M	PIPESTEM ST. PARK	06/25/92 e	75	NORM	0.46
M	PIPESTEM ST. PARK	07/09/92 e	19	NORM	0.05
M	PIPESTEM ST. PARK	07/23/92	54	NORM	TRACE
M	PIPESTEM ST. PARK	08/06/92	19	2.5	0.00
M	PIPESTEM ST. PARK	08/20/92 e	8	NORM	0.00
M	PIPESTEM ST. PARK	09/16/92 e	8	2.2	0.00
T	MT. CREEK	04/13/92	6	HIGH	0.06
T	MT. CREEK	05/05/92	34	HIGH	0.09
T	MT. CREEK	05/18/92 e	124	HIGH	1.92
T	MT. CREEK	06/11/92 e	*230	HIGH	0.76
T	MT. CREEK	06/25/92 e	*344	NORM	0.46
T	MT. CREEK	07/09/92	68	NORM	0.05
T	MT. CREEK	07/23/92	78	NORM	TRACE
T	MT. CREEK	08/06/92 e	5	NORM	0.00
T	MT. CREEK	08/20/92	36	NORM	0.00
T	MT. CREEK	09/16/92 e	14	LOW	0.00

The FECAL COLIFORM PER 100ml of SAMPLE means the number of fecal coliform colonies cou on the membrane filter and then adjusted for 100ml of sample.

e Indicates that the value is estimated
> That the value is estimated as being greater than the one displayed
< That the value is estimated as being less than the one displayed
* Indicates values greater than 200 counts per 100ml

APPENDIX 5. FECAL COLIFORM BACTERIA VALUES FOR GAULEY RIVER NATIONAL RECREATION AREA

Site No.	Site Name	Date	FC/100ml	Level	Precip
01M	SUMMERSVILLE DAM	04/30/92 e	6	11.33	0.00
01M	SUMMERSVILLE DAM	05/13/92 e	12	8.73	0.00
01M	SUMMERSVILLE DAM	06/04/92 e	3	8.71	0.13
01M	SUMMERSVILLE DAM	06/15/92	< 0	8.50	0.12
01M	SUMMERSVILLE DAM	06/29/92 e	0	7.25	0.00
01M	SUMMERSVILLE DAM	07/16/92 e	1	7.07	0.10
01M	SUMMERSVILLE DAM	07/27/92 e	2	8.08	1.66
01M	SUMMERSVILLE DAM	08/13/92 e	1	9.40	0.14
01M	SUMMERSVILLE DAM	08/24/92 e	1	6.99	0.00
01M	SUMMERSVILLE DAM	09/10/92	4	6.43	0.53
01M	SUMMERSVILLE DAM	09/14/92	1	10.40	0.00
01M	SUMMERSVILLE DAM	09/21/92	1	10.51	
01M	SUMMERSVILLE DAM	10/01/92	< 0	7.40	0.00
02M	MID-GAULEY	04/30/92 e	7	HIGH	0.00
02M	MID-GAULEY	05/13/92 e	11	NORM	0.00
02M	MID-GAULEY	06/04/92	18	HIGH	0.13
02M	MID-GAULEY	06/15/92 e	6	HIGH	0.12
02M	MID-GAULEY	06/29/92 e	3	NORM	0.00
02M	MID-GAULEY	07/16/92 e	5	NORM	0.10
02M	MID-GAULEY	07/27/92	20	NORM	1.66
02M	MID-GAULEY	08/13/92 e	6	NORM	0.14
02M	MID-GAULEY	08/24/92 e	4	LOW	0.00
02M	MID-GAULEY	09/10/92	2	LOW	0.53
02M	MID-GAULEY	09/14/92	10	HIGH	0.00
02M	MID-GAULEY	09/21/92	1	LOW	
02M	MID-GAULEY	10/01/92 e	2	LOW	0.00
03T	PETER'S CREEK	04/30/92 e	178	NORM	0.00
03T	PETER'S CREEK	05/13/92 e	34	NORM	0.00
03T	PETER'S CREEK	06/04/92	> 60	HIGH	0.13
03T	PETER'S CREEK	06/15/92	> *1200	HIGH	0.12
03T	PETER'S CREEK	06/29/92	< 33	NORM	0.00
03T	PETER'S CREEK	07/16/92 e	*233	NORM	0.10
03T	PETER'S CREEK	07/27/92	*1867	HIGH	1.66
03T	PETER'S CREEK	08/13/92 e	180	NORM	0.14
03T	PETER'S CREEK	08/24/92 e	52	NORM	0.00
03T	PETER'S CREEK	09/10/92	40	NORM	0.53
03T	PETER'S CREEK	09/14/92	40	LOW	0.00
03T	PETER'S CREEK	09/21/92	60	LOW	
03T	PETER'S CREEK	10/01/92 e	20	LOW	0.00
04M	SOUTHSIDE SWISS	04/30/92 e	12	HIGH	0.00
04M	SOUTHSIDE SWISS	05/13/92 e	7	NORM	0.00
04M	SOUTHSIDE SWISS	06/04/92	22	HIGH	0.13
04M	SOUTHSIDE SWISS	06/15/92 e	195	HIGH	0.12
04M	SOUTHSIDE SWISS	06/29/92 e	2	NORM	0.00
04M	SOUTHSIDE SWISS	07/16/92 e	8	NORM	0.10
04M	SOUTHSIDE SWISS	07/27/92 e	*244	NORM	1.66
04M	SOUTHSIDE SWISS	08/13/92 e	2	NORM	0.14
04M	SOUTHSIDE SWISS	09/10/92	3	LOW	0.53
04M	SOUTHSIDE SWISS	09/14/92	5	LOW	0.00
04M	SOUTHSIDE SWISS	09/21/92	3	LOW	
04M	SOUTHSIDE SWISS	10/01/92 e	2	LOW	0.00

The FECAL COLIFORM PER 100ml of SAMPLE means the number of fecal coliform colonies cou on the membrane filter and then adjusted for 100ml of sample.

e Indicates that the value is estimated
> That the value is estimated as being greater than the one displayed
< That the value is estimated as being less than the one displayed
* Indicates values greater than 200 counts per 100ml

APPENDIX 6. RAW DATA FOR 1992 FECAL COLIFORM STUDY

TE NO	SITE NAME	DATE	TIME	WaterTEMP	FC/100ml	AIRTEMP	pH	STRMLVL	H2OCONDITION/NTU	INCUB	DO	DILUTIONS	WEATHER	CONDUCT	PRECIP	COMMENTS
M	BLUESTONE ST. PARK	04/13/92	12:00	12.0	32	14.0	6.5	HIGH H,	SW, MI, 5.5 NTU	22:00	12.30	100ML:32/125ML:39	CLR	110.0	0.06	125ML HAD A WHITE MOLD GROWING.
M	BLUESTONE ST. PARK	05/05/92	1:28	16.0	6	17.0	7.1	NORM N,	SW, 2.5 NTU	24:00	12.20	100ML:6/125ML:6	BKN	155.0	0.09	EST.
M	BLUESTONE ST. PARK	05/18/92	11:43	16.0	133	24.0	7.5	HIGH H,	SW, 17 NTU	22:00	9.80	150ML:199/200ML:200	OVC	100.0	1.92	EST. 1090 CFS.
M	BLUESTONE ST. PARK	06/11/92	10:50	16.0	156	19.0	6.6	HIGH H,	SW, TURBD,20 NTU	22:45	9.60	25ML:39/50ML:102	OVC	119.0	0.76	SITE HAD BEEN UNDER WATER ON 6/5-6/7/92 24,800 CFS.
M	BLUESTONE ST. PARK	06/25/92	10:14	20.0	75	23.0	8.0	NORM N,	SW, 4.7 NTU	23:00	9.20	100ML:75/150ML:144	BKN, R	220.0	0.46	EST. 6200 CFS.
M	BLUESTONE ST. PARK	07/09/92	10:40	23.0	26	28.0	7.6	NORM N,	SW, CLR, 2.7 NTU	22:50	8.00	50ML:13/100ML:9	OVC	210.0	0.05	EST. 3900 CFS
M	BLUESTONE ST. PARK	07/23/92	10:36	25.0	38	24.0	8.3	NORM N,	M, 3.1 NTU	22:45	7.70	100ML:45/150ML:48	OVC, R	332.0	TRACE	3550 CFS.
M	BLUESTONE ST. PARK	08/06/92	9:50	22.0	20	20.0	8.6	NORM N,	M, CLR, 2.8 NTU	24:00	8.20	100ML:12/150ML:30	OVC	285.0	0.00	71 CFS.
M	BLUESTONE ST. PARK	08/20/92	11:03	21.0	19	24.0	8.7	NORM N,	SW, CLR, 3.1 NTU	22:10	9.60	100ML:17/150ML:28	SCT	224.0	0.00	26,000 CFS. HINTON, 2500 CFS OTHER
M	BLUESTONE ST. PARK	09/16/92	10:30	21.0	19	21.0	8.0	LOW L,	SL, CLR, 1.5 NTU	23:00	8.40	150ML:30/200ML:34	OVC	235.0	0.00	
T	LITTLE BLUESTONE	04/13/92	1:10	11.0	4	17.0	6.8	HIGH H,	SW, MI, 4.2 NTU	22:00	11.40	75ML:2/100ML:4	CLR	40.0	0.60	EST.
T	LITTLE BLUESTONE	05/05/92	12:02	12.0	17	17.0	7.1	HIGH H,	SW, MI, 3.8 NTU	24:00	11.60	125ML:27/175ML:23	BKN	45.0	0.90	
T	LITTLE BLUESTONE	05/18/92	10:28	14.0	231	22.0	7.1	HIGH H,	SL, MR, 16 NTU	22:00	9.90	75ML:173/100ML:204	OVC	45.0	1.92	EST.
T	LITTLE BLUESTONE	06/11/92	12:04	15.0	156	18.0	6.4	NORM N,	SW, MR, 7.9 NTU	22:45	9.60	25ML:39/50ML:76	OVC, R	58.0	0.76	STREAM WELL OVER ITS BANKS ON 6/5-6/7/92
T	LITTLE BLUESTONE	06/25/92	11:38	17.0	1253	24.0	7.1	NORM N,	M, MR,TURBD,26 N	23:00	9.10	15ML:188/30ML:TNTC	BKN	75.0	0.46	EST. SUCK CR. VERY MUDDY--POSSIBLY FROM HEAVY LOCAL RAIN.
T	LITTLE BLUESTONE	07/09/92	11:50	19.0	70	27.0	7.3	NORM N,	M, CLR, 2.1 NTU	22:50	8.90	25ML:10/50ML:35	BKN	78.0	0.05	
T	LITTLE BLUESTONE	07/23/92	12:06	22.0	124	27.0	7.7	NORM N,	SL, CLR, 1.6 NTU	22:45	8.30	25ML:31/50ML:75	OVC, R	125.0	TRACE	
T	LITTLE BLUESTONE	08/06/92	11:04	18.0	15	20.0	8.1	NORM N,	SL, CLR, 1.1 NTU	24:00	6.50	50ML:9/100ML:15	OVC	100.0	0.00	EST.
T	LITTLE BLUESTONE	08/20/92	12:21	18.0	26	24.0	8.0	NORM N,	M, CLR, 2.4 NTU	22:10	9.50	30ML:11/70ML:18	SCT	75.0	0.00	EST.
T	LITTLE BLUESTONE	09/16/92	11:20	20.5	11	22.0	7.0	LOW L,	SL, CLR, 1.1 NTU	23:00	8.50	100ML:10/125ML:14	CLR, R	80.0	0.00	EST.
M	CONFLUENCE	04/13/92	1:30	12.0	16	17.0	7.8	HIGH H,	SW, MI, 4.8 NTU	22:00	10.20	75ML:12/100ML:10	CLR	110.0	0.06	75ML HAD 2 LARGE CLEAR FLAT COLONIES IN THE CENTER. EST.
M	CONFLUENCE	05/05/92	12:20	16.0	8	17.0	7.7	NORM N,	SL, CLR, 2.7 NTU	24:00	12.20	125ML:2/175ML:14	BKN	160.0	0.09	EST.
M	CONFLUENCE	05/18/92	10:43	16.0	117	22.0	7.4	NORM N,	M, MR, 16 NTU	22:00	9.60	75ML:88/125ML:123	OVC	110.0	1.92	EST. 1090 CFS.
M	CONFLUENCE	06/11/92	12:20	15.0	168	19.0	7.1	HIGH H,	M, MR, 17 NTU	22:45	9.30	25ML:42/50ML:87	OVC, R	120.0	0.76	RIVER WELL OVER ITS BANKS ON 6/5-6/7/92 24,800 CFS.
M	CONFLUENCE	06/25/92	12:01	20.0	70	23.0	8.0	NORM N,	SL, 3.6 NTU	23:00	9.40	50ML:35/100ML:79	BKN	230.0	0.46	6200 CFS.
M	CONFLUENCE	07/09/92	12:12	23.0	17	28.0	7.9	NORM N,	SL, CLR, 2.6 NTU	22:50	8.20	50ML:6/100ML:17	BKN	221.0	0.05	EST. 3900 CFS.
M	CONFLUENCE	07/23/92	12:36	24.0	58	29.0	7.8	NORM N,	SL, 3.2 NTU	22:45	7.10	100ML:58/150ML:76	OVC	335.0	TRACE	3550 CFS.
M	CONFLUENCE	08/06/92	11:36	21.0	15	21.0	8.4	NORM N,	SL, 4.2 NTU	24:00	1.20	100ML:17/150ML:23	OVC	210.0	0.00	71 CFS.
M	CONFLUENCE	08/20/92	12:45	21.0	19	24.0	8.1	NORM N,	SL, MI, 4.8 NTU	22:10	8.20	100ML:22/150ML:23	SCT	239.0	0.00	26,000 CFS HINTON, 2500 CFS OTHER
M	CONFLUENCE	09/16/92	11:35	21.0	21	20.5	7.9	HIGH L,	SL, MI, 4.6 NTU	23:00	7.20	100ML:20/150ML:32	CLR, H	260.0	0.00	
M	PIPESTEM ST. PARK	04/13/92	2:30	13.0	12	17.0	8.3	4.90 H,	SW, MI, 4.5 NTU	22:00	12.90	75ML:3/100ML:12	CLR	115.0	0.06	EST.
M	PIPESTEM ST. PARK	05/05/92	10:55	15.0	6	14.0	7.7	3.70 N,	M, 2.45 NTU	24:00	11.60	100ML:7/150ML:9	BKN	165.0	0.09	EST
M	PIPESTEM ST. PARK	05/18/92	12:43	15.0	150	22.0	7.3	5.60 H,	M, TURBD, 27 NTU	22:00	10.00	100ML:150/150ML:80	OVC	110.0	1.92	EST. 1090 CFS.
M	PIPESTEM ST. PARK	06/11/92	2:00	15.0	180	18.0	6.9	5.45 H,	SW, MR, 16.5 NTU	22:45	9.70	25ML:45/50ML:76	OVC, R	140.0	0.76	RIVER WELL OVER ITS BANKS ON 6/5-6/7/92 24,800 CFS.
M	PIPESTEM ST. PARK	06/25/92	1:39	21.0	75	25.0	8.3	3.13 N,	M, 3.8 NTU	23:00	10.00	75ML:56/125ML:71	BKN	220.0	0.46	6200 CFS.
M	PIPESTEM ST. PARK	07/09/92	1:55	23.0	19	29.0	8.5	2.89 N,	M, CLR, 2.3 NTU	22:50	9.00	50ML:5/100ML:19	BKN	225.0	0.05	EST. 3900 CFS.
M	PIPESTEM ST. PARK	07/23/92	2:14	26.0	54	30.0	8.6	2.54 N,	M, 4.4 NTU	22:45	9.30	100ML:54/150ML:94	BKN	352.0	TRACE	3550 CFS.
M	PIPESTEM ST. PARK	08/06/92	12:57	21.0	19	21.0	8.7	2.50 N,	M, CLR, 2.5 NTU	24:00	8.70	125ML:24/175ML:18	OVC	291.0	0.00	71 CFS.
M	PIPESTEM ST. PARK	08/20/92	2:01	22.0	8	24.0	9.0	2.71 N,	M, CLR, 3.4 NTU	22:10	9.70	100ML:10/150ML:12	BKN	251.0	0.00	EST. 26000 CFS HINTON, 2500 CFS OTHER

ITE NO	SITE NAME	DATE	TIME	WaterTEMP	FC/100ml	AIRTEMP	pH	STRMLVL	H2OCONDITION/NTU	INCUB	DO	DILUTIONS	WEATHER	CONDUCT	PRECIP	COMMENTS
4M	PIPESTEM ST. PARK	09/16/92	12:20	22.0	8	24.5	8.4	2.20 L,	SL, CLR, 1.9 NTU	23:00	11.00	200ML:12/250ML:19	CLR, H	260.0	0.00	EST.
5T	MT. CREEK	04/13/92	2:55	11.0	6	19.0	6.5	HIGH H,	SW, MI, 5.4 NTU	22:00	11.10	75ML:2/100ML:6	CLR	70.0	0.06	75′:1 100′:8 EST.
5T	MT. CREEK	05/05/92	10:35	11.0	34	12.0	6.7	HIGH H,	SW, 3.2 NTU	24:00	11.60	100ML:34/150ML:51	BKN	75.0	0.09	
5T	MT. CREEK	05/18/92	1:18	13.0	124	20.0	10.8	HIGH H,	SW, MR, 11.5 NTU	22:00	10.40	75ML:93/125ML:132	OVC, L	50.0	1.92	EST.
5T	MT. CREEK	06/11/92	1:38	14.0	230	18.0	6.2	HIGH H,	SW, 7.6 NTU	22:45	10.20	50ML:115/75ML:133	OVC, R	56.0	0.76	STREAM WELL OVER ITS BANKS ON 6/5-6/7/92 EST ON FECALS
5T	MT. CREEK	06/25/92	1:12	17.0	344	24.0	7.1	NORM N,	SW, 8.2 NTU	23:00	9.40	50ML:172/75ML:TNTC	BKN	88.0	0.46	EST.
5T	MT. CREEK	07/09/92	1:25	18.0	68	27.0	7.2	NORM N,	SW, CLR, 3.2 NTU	22:50	9.10	25ML:15/50ML:34	BKN	80.0	0.05	
5T	MT. CREEK	07/23/92	1:54	21.0	78	26.0	7.8	NORM N,	SW, CLR, 1.8 NTU	22:45	8.40	40ML:33/60ML:44	BKN	370.0	TRACE	
5T	MT. CREEK	08/06/92	12:29	17.0	5	19.0	8.0	NORM N,	M, CLR, 0.7 NTU	24:00	8.70	75ML:4/127ML:1	OVC	175.0	0.00	EST.
5T	MT. CREEK	08/20/92	1:41	18.0	36	24.0	7.8	NORM N,	SW, CLR, 2.4 NTU	22:10	9.00	50ML:17/100ML:36	BKN	89.0	0.00	
5T	MT. CREEK	09/16/92	12:40	22.5	14	24.0	8.0	LOW L,	M, CLR, 1.6 NTU	23:00	9.80	100ML:8/125ML:18	CLR, H	260.0	0.00	EST.

SITE NO	SITE NAME	DATE	TIME	WaterTEMP	FC/100ml	AIRTEMP	pH	STRMLVL	H2OCONDITION/NTU	INCUB	DO	DILUTIONS	WEATHER	CONDUCT	PRECIP	COMMENTS
1M	SUMMERSVILLE DAM	04/30/92	1:25	6.0	6	12.0	7.9	11.33	H,S,CLR, 5.3NTU	23:15	15.00	200ML:13/250ML:15	OVC, R	40.0	0.00	*2182 CFS; 1360.29 GAULEY RIVER LEVEL(BLACK BOX); 1652.19 LA
1M	SUMMERSVILLE DAM	05/13/92	3:30	11.0	12	25.0	6.3	8.73	N,M,MI, 4.5NTU	22:05	13.60	200ML:21/250ML:33	SCT, H	48.0	0.00	IN 200ML DISH--ONE LARGE TRANSPARENT BACTERIA GROWING; ™1000
1M	SUMMERSVILLE DAM	06/04/92	10:38	12.0	3	20.0	6.1	8.71	H,SW,CLR, 3.4NTU	23:00	10.90	200ML:3/250ML:7	OVC	45.0	0.13	*CFS; EST. FECAL VALUE; WATER MOLD IN DILUTION 200ML.
1M	SUMMERSVILLE DAM	06/15/92	12:50	13.0	0	34.0	6.5	8.50	H,SW,CLR, 1.6NTU	23:30	10.80	200ML:0/250ML:0	SCT	50.0	0.12	RIVER LEVEL=1652.74; 990 CFS.; FECAL VALUE _0.4/100ML.
1M	SUMMERSVILLE DAM	06/29/92	2:35	15.0	0	29.0	6.8	7.25	N,M,CLR, 1.8NTU	22:05	10.80	250ML:1/200ML:1	BKN, H	53.0	0.00	EST FECAL VALUE=0.4/100ML; 238 CFS.
1M	SUMMERSVILLE DAM	07/16/92	12:37	16.0	1	35.0	7.4	7.07	L,SW,CLR, 1.5NTU	23:35	10.20	300ML:3/250ML:0	SCT	50.0	0.10	EST. 1/100ML; 365 CFS.
1M	SUMMERSVILLE DAM	07/27/92	1:30	16.0	2	24.0	7.1	8.08	N,SW,CLR, 1.9NTU	22:50	10.40	250ML:2/200ML:4	OVC, RW	60.0	1.66	EST. 2/100ML; 780 CFS.
1M	SUMMERSVILLE DAM	08/13/92	10:42	18.0	1	22.0	7.0	9.40	N,SW,CLR, 1.7NTU	23:05	10.00	300ML:4/500ML:6	OVC	65.0	0.14	EST. FECAL VALUE=1.0/100ML; RIVER LEVEL=1530 CFS.
1M	SUMMERSVILLE DAM	08/24/92	3:30	20.5	1	28.0	7.0	6.99	L,M,CLR, 3.1NTU	24:10	8.90	250ML:0/400ML:4	SCT	60.0	0.00	EST. FECAL VALUE=1.0/100ML; RIVER LEVEL=1356.79; 339.5 CFS.
1M	SUMMERSVILLE DAM	09/10/92	12:55	19.5	4	29.0	7.4	6.43	H,SW,CLR, 1.5NTU	23:00	9.00	250ML:13/400ML:16	SCT, H	63.0	0.53	RIVER LEVEL=8.50'; 990 CFS.
1M	SUMMERSVILLE DAM	09/14/92	1:15	18.8	1	26.5	8.2	10.40	H,SW,CLR, 1.7NTU	23:20	9.20	200ML:0/250ML:2	SCT, H	69.0	0.00	EST. FECAL VALUE=0.8/100ML; RIVER LEVEL-2310 CFS.
1M	SUMMERSVILLE DAM	09/21/92	11:45	21.0	1	35.0	6.6	10.51	H,SW CLR, 1.5NTU	23:20	8.50	300ML:1/500ML:4	SCT	70.0		EST. FECAL VALUE=0.8/100ML; GAUGE OUT.
1M	SUMMERSVILLE DAM	10/01/92	2:35	18.0	0	18.0	7.4	7.40	N,M,CLR, 1.4NTU	23:00	9.20	150ML:0/250ML:0	CLR	80.0	0.00	EST. FECAL VALUE_0.4/100ML. RIVER LEVEL=7.4'; 430 CFS.
2M	MID-GAULEY	04/30/92	11:45	8.0	7	14.0	8.0	HIGH	H,M,MI, 5.0NTU	23:15	14.00	100ML:9/150ML:10	OVC	40.0	0.00	*2182 CFS; 1360.29 GAULEY RIVER LEVEL (BL. BOX); 1662.19 LAKE
2M	MID-GAULEY	05/13/92	2:10	14.0	11	26.0	6.5	NORM	N,M,MI, 5.0NTU	22:05	12.00	100ML:8/150ML:17	OVC, H	50.0	0.00	EST.; LAKE LEVEL = 1652.5; ™1000 CFS.
2M	MID-GAULEY	06/04/92	11:52	14.0	18	21.0	6.0	HIGH	H,M,MI, 4.9NTU	23:00	10.10	200ML:40/250ML:39	OVC, R	52.0	0.13	*CFS.
2M	MID-GAULEY	06/15/92	11:15	17.0	6	29.0	6.7	HIGH	H,M,MI, 1.7NTU	23:30	10.00	150ML:7/200ML:11	SCT	60.0	0.12	RIVER LEVEL=1652.74; 990 CFS.; EST. FECAL VALUE OF 5.50.
2M	MID-GAULEY	06/29/92	1:00	20.0	3	33.0	6.5	NORM	N,M,CLR, 1.5NTU	22:05	9.60	200ML:6/150ML:6	SCT, H	90.0	0.00	EST. FECAL VALUE=3.0/100ML; 238 CFS.
2M	MID-GAULEY	07/16/92	11:20	23.0	5	32.0	7.4	NORM	N,SL,CLR, 1.1NTU	23:35	8.60	250ML:12/150ML:3	SCT	80.0	0.10	EST. 4.8/100ML; 365 CFS.
2M	MID-GAULEY	07/27/92	11:45	20.0	20	27.0	6.8	NORM	N,SL,MR, 5.0NTU	22:50	9.30	100ML:20/50ML:9	OVC, RW	70.0	1.66	RIVER LEVEL=789 CFS.
2M	MID-GAULEY	08/13/92	11:56	19.0	6	23.0	6.9	NORM	N,SL,CLR, 1.4NTU	23:05	9.30	150ML:1/300ML:19	OVC, R	70.0	0.14	EST FECAL VALUE=6.0/100ML; RIVER LEVEL=1530.
2M	MID-GAULEY	08/24/92	4:10	23.0	4	27.0	7.9	LOW	L,SL,CLR, 2.1NTU	24:10	8.60	200ML:0/250ML:9	SCT	70.0	0.00	EST. FECAL VALUE=3.6/100ML; RIVER LEVEL=1356.79; 339.5 CFS.
2M	MID-GAULEY	09/10/92	11:35	23.5	2	27.0	7.3	LOW	L,SL,CLR, 1.2NTU	23:00	8.40	200ML:1/250ML:4	SCT, H	81.0	0.53	FECAL VALUE=1.6/100ML; RIVER LEVEL=8.50'; 990 CFS.
2M	MID-GAULEY	09/14/92	12:30	18.5	10	28.0	6.3	HIGH	H,M,CLR, 2,6NTU	23:20	9.20	150ML:8/300ML:29	SCT, H	70.0	0.00	EST. FECAL VALUE=9.6/100ML; RIVER LEVEL=2310 CFS.
2M	MID-GAULEY	09/21/92	11:00	21.0	1	23.0	6.7	LOW	L,SL,CLR, 1.3NTU	23:20	8.20	150ML:1/300ML:4	OVC	75.0		EST. FECAL VALUE=1.3/100ML; GAUGE OUT.
2M	MID-GAULEY	10/01/92	1:10	18.0	2	20.0	7.5	LOW	L,SL,CLR, 1.2NTU	23:00	9.60	150ML:2/250ML:5	CLR	82.0	0.00	EST. FECAL VALUE=2.0/100ML
3T	PETER'S CREEK	04/30/92	12:00	11.0	178	11.0	7.8	NORM	N,M,MR, 5.5NTU	23:15	12.60	50ML:89/100ML:174	OVC	150.0	0.00	EST.
3T	PETER'S CREEK	05/13/92	2:30	18.0	34	24.0	7.0	NORM	N,M,MI, 2.8NTU	22:05	10.60	25ML:8/50ML:17	SCT, H	250.0	0.00	EST.
3T	PETER'S CREEK	06/04/92	11:34	16.0	60	24.0	7.1	HIGH	H,M,MI, 12.0NTU	23:00	9.20	100ML:TNTC150ML:TNTC	OVC, R	211.0	0.13	FECAL COUNTS ¢60/100ML
3T	PETER'S CREEK	06/15/92	12:00	19.0	1200	25.0	7.4	HIGH	H,M,TURBID100+NTU	23:30	8.40	5ML:TNTC/10ML:TNTC	SCT	200.0	0.12	TURBIDITY READINGS WERE OFF THE SCALE; ¢1200 FECALS/100.
3T	PETER'S CREEK	06/29/92	1:20	21.0	33	28.0	7.7	NORM	N,S,L, 8.1NTU	22:05	9.00	3.0ML:0/1.0ML:0	SCT, H	350.0	0.00	FECAL VALUE _33.3/100ML
3T	PETER'S CREEK	07/16/92	11:42	24.0	233	26.0	8.3	NORM	N,M,TURBID32.0NTU	23:35	8.20	3.0ML:7/1.0ML:3	SCT	490.0	0.10	EST. 233.3/100ML
3T	PETER'S CREEK	07/27/92	12:02	21.0	1867	26.0	7.8	HIGH	H,M,TURBID100+NTU	22:50	8.40	1.0ML:17/3.0ML:56	OVC, RW	200.0	1.66	TURBIDITY ¢100NTU
3T	PETER'S CREEK	08/13/92	12:16	21.0	180	23.0	8.2	NORM	N,M,MI, 6.8NTU	23:05	8.50	5.0ML:4/10ML:18	OVC, R	340.0	0.14	EST. FECAL VALUE=180/100ML
3T	PETER'S CREEK	08/24/92	4:30	21.0	52	26.0	8.7	NORM	N,SL,MI, 3.8NTU	24:10	8.50	20ML:12/25ML:13	SCT	350.0	0.00	EST. FECAL VALUE=52/100ML.
3T	PETER'S CREEK	09/10/92	11:50	21.5	40	25.0	8.2	NORM	N,SL,MI, 3.6NTU	23:00	8.40	35ML:16/50ML:20	SCT, H	330.0	0.53	
3T	PETER'S CREEK	09/14/92	12:15	20.0	40	22.0	7.7	LOW	L,SL,MI, 3,5NTU	23:20	8.80	5.0ML:3/10ML:4	SCT, H	330.0	0.00	
3T	PETER'S CREEK	09/21/92	10:95	19.0	60	20.5	7.3	LOW	L,SL,MI, 2.9NTU	23:20	8.60	5.0ML:2/10ML:6	OVC	380.0		GAUGE OUT
3T	PETER'S CREEK	10/01/92	1:30	12.5	20	16.0	8.4	LOW	L,SL,MI, 1.8NTU	23:00	11.20	15ML:3/25ML:2	CLR	370.0	0.00	EST. FECAL VALUE=20/100ML

SITE NO	SITE NAME	DATE	TIME	WaterTEMP	FC/100ml	AIRTEMP	pH	STRMLVL	H2OCONDITION/NTU	INCUB	DO	DILUTIONS	WEATHER	CONDUCT	PRECIP	COMMENTS
04M	SOUTHSIDE SWISS	04/30/92	11:00	9.0	12	15.0	7.1	HIGH	H,M,MI, 5.0NTU	23:15	13.80	100ML:16/150ML:18	OVC, R	50.0	0.00	*2182 CFS; 1360.29 GAULEY RIVER LEVEL (BL. BOX); 1652.19 LA
04M	SOUTHSIDE SWISS	05/13/92	1:30	14.0	7	25.0	6.6	NORM	N,M,MI, 4.5NTU	22:05	11.60	100ML:5/150ML:10	SCT, H	53.0	0.00	EST.; LAKE LEVEL=1652.5; ™1000 CFS.
04M	SOUTHSIDE SWISS	06/04/92	12:43	15.0	22	21.0	6.4	HIGH	H,SL,MI, 4.5NTU	23:00	9.50	200ML:44/250ML:57	OVC, R	59.0	0.13	*CFS.
04M	SOUTHSIDE SWISS	06/15/92	10:15	17.0	195	27.0	6.7	HIGH	H,M,MR, 10.0NTU	23:30	9.80	100ML:195/150ML:TNTC	CLR.	82.0	0.12	RIVER LEVEL=1652.74; 990 CFS.; EST.FECAL VALUE.
04M	SOUTHSIDE SWISS	06/29/92	11:15	20.0	2	29.0	6.3	NORM	N,SL,CLR, 1.5NTU	22:05	9.00	150ML:0/100ML:2	OVC.	83.0	0.00	RIVER LEVEL=1356; 238 CFS.; EST. FECAL VALUE=2.0/100ML
04M	SOUTHSIDE SWISS	07/16/92	10:30	23.0	8	28.0	7.3	NORM	N,M,CLR, 1.2NTU	23:35	8.20	200ML:15/150ML:6	SCT	85.0	0.10	EST. 7.5/100ML; 365 CFS.
04M	SOUTHSIDE SWISS	07/27/92	10:45	19.0	244	26.0	7.1	NORM	N,SL,MR, 23.0NTU	22:50	9.00	50ML:113/25ML:61	OVC, RW	95.0	1.66	EST. FECAL VALUE=244; RIVER LEVEL=780 CFS
04M	SOUTHSIDE SWISS	08/13/92	1:27	22.0	2	26.0	7.7	NORM	N,SL,CLR, 1.9NTU	23:05	8.70	150ML:2/300ML:7	OVC, R	75.0	0.14	EST. FECAL VALUE=2.0/100ML; RIVER LEVEL=1530 CFS.
04M	SOUTHSIDE SWISS	09/10/92	10:45	24.0	3	25.0	7.1	LOW	L,SL,MI, 2.1NTU	23:00	7.60	100ML:2/125ML:4	SCT, H	99.0	0.53	RIVER LEVEL=8.50'; 990 CFS.
04M	SOUTHSIDE SWISS	09/14/92	11:30	21.0	5	24.5	7.4	LOW	L,SL,MI, 2.2NTU	23:20	8.80	150ML:3/300ML:15	SCT, H	72.0	0.00	RIVER LEVEL=2310 CFS.
04M	SOUTHSIDE SWISS	09/21/92	10:00	21.0	3	22.5	7.0	LOW	L,SL,MI, 1.9NTU	23:20	8.10	150ML:7/300ML:9	OVC	80.0		GAUGE OUT
04M	SOUTHSIDE SWISS	10/01/92	12:25	19.0	2	15.0	7.5	LOW	L,SL,CLR, 1.4NTU	23:00	9.20	150ML:3/250ML:5	CLR	86.0	0.00	EST. FECAL VALUE=2.0/100ML; RIVER LEVEL=7.4'; 430 CFS.

APPENDIX 5. FECAL COLIFORM BACTERIA VALUES FOR GAULEY RIVER NATIONAL RECREATION AREA

No.	Site Name	Date		FC/100ml	Level	Precip
	SUMMERSVILLE DAM	04/30/92	e	6	11.33	0.00
	SUMMERSVILLE DAM	05/13/92	e	12	8.73	0.00
	SUMMERSVILLE DAM	06/04/92	e	3	8.71	0.13
	SUMMERSVILLE DAM	06/15/92	<	0	8.50	0.12
	SUMMERSVILLE DAM	06/29/92	e	0	7.25	0.00
	SUMMERSVILLE DAM	07/16/92	e	1	7.07	0.10
	SUMMERSVILLE DAM	07/27/92	e	2	8.08	1.66
	SUMMERSVILLE DAM	08/13/92	e	1	9.40	0.14
	SUMMERSVILLE DAM	08/24/92	e	1	6.99	0.00
	SUMMERSVILLE DAM	09/10/92		4	6.43	0.53
	SUMMERSVILLE DAM	09/14/92		1	10.40	0.00
	SUMMERSVILLE DAM	09/21/92		1	10.51	
	SUMMERSVILLE DAM	10/01/92	<	0	7.40	0.00
	MID-GAULEY	04/30/92	e	7	HIGH	0.00
	MID-GAULEY	05/13/92	e	11	NORM	0.00
	MID-GAULEY	06/04/92		18	HIGH	0.13
	MID-GAULEY	06/15/92	e	6	HIGH	0.12
	MID-GAULEY	06/29/92	e	3	NORM	0.00
	MID-GAULEY	07/16/92	e	5	NORM	0.10
	MID-GAULEY	07/27/92		20	NORM	1.66
	MID-GAULEY	08/13/92	e	6	NORM	0.14
	MID-GAULEY	08/24/92	e	4	LOW	0.00
	MID-GAULEY	09/10/92		2	LOW	0.53
	MID-GAULEY	09/14/92		10	HIGH	0.00
	MID-GAULEY	09/21/92		1	LOW	
	MID-GAULEY	10/01/92	e	2	LOW	0.00
	PETER'S CREEK	04/30/92	e	178	NORM	0.00
	PETER'S CREEK	05/13/92	e	34	NORM	0.00
	PETER'S CREEK	06/04/92	>	60	HIGH	0.13
	PETER'S CREEK	06/15/92	>	*1200	HIGH	0.12
	PETER'S CREEK	06/29/92	<	33	NORM	0.00
	PETER'S CREEK	07/16/92	e	*233	NORM	0.10
	PETER'S CREEK	07/27/92		*1867	HIGH	1.66
	PETER'S CREEK	08/13/92	e	180	NORM	0.14
	PETER'S CREEK	08/24/92	e	52	NORM	0.00
	PETER'S CREEK	09/10/92		40	NORM	0.53
	PETER'S CREEK	09/14/92		40	LOW	0.00
	PETER'S CREEK	09/21/92		60	LOW	
	PETER'S CREEK	10/01/92	e	20	LOW	0.00
	SOUTHSIDE SWISS	04/30/92	e	12	HIGH	0.00
	SOUTHSIDE SWISS	05/13/92	e	7	NORM	0.00
	SOUTHSIDE SWISS	06/04/92		22	HIGH	0.13
	SOUTHSIDE SWISS	06/15/92	e	195	HIGH	0.12
	SOUTHSIDE SWISS	06/29/92	e	2	NORM	0.00
	SOUTHSIDE SWISS	07/16/92	e	8	NORM	0.10
	SOUTHSIDE SWISS	07/27/92	e	*244	NORM	1.66
	SOUTHSIDE SWISS	08/13/92	e	2	NORM	0.14
	SOUTHSIDE SWISS	09/10/92		3	LOW	0.53
	SOUTHSIDE SWISS	09/14/92		5	LOW	0.00
	SOUTHSIDE SWISS	09/21/92		3	LOW	
	SOUTHSIDE SWISS	10/01/92	e	2	LOW	0.00

The FECAL COLIFORM PER 100ml of SAMPLE means the number of fecal coliform colonies counted on the membrane filter and then adjusted for 100ml of sample.

J e Indicates that the value is estimated
L > That the value is estimated as being greater than the one displayed
K < That the value is estimated as being less than the one displayed
* Indicates values greater than 200 counts per 100ml

APPENDIX 4. FECAL COLIFORM BACTERIA VALUES FOR BLUESTONE NATIONAL SCENIC RIVER

No.	Site Name	Date	FC/100ml	Level	Precip
	BLUESTONE ST. PARK	04/13/92	32	4.90	0.06 30
	BLUESTONE ST. PARK	05/05/92	6	5.10	0.09
	BLUESTONE ST. PARK	05/18/92 e	133	5.60	1.92
	BLUESTONE ST. PARK	06/11/92	156	5.70	0.76
	BLUESTONE ST. PARK	06/25/92 e	75	NORM	0.46
	BLUESTONE ST. PARK	07/09/92 e	26	2.60	0.05
	BLUESTONE ST. PARK	07/23/92	38	2.20	TRACE
	BLUESTONE ST. PARK	08/06/92	20	2.35	0.00
	BLUESTONE ST. PARK	08/20/92	19	2.00	0.00
	BLUESTONE ST. PARK	09/16/92	19	1.90	0.00
	LITTLE BLUESTONE	04/13/92	4	HIGH	0.60
	LITTLE BLUESTONE	05/05/92	17	HIGH	0.90
	LITTLE BLUESTONE	05/18/92 e	*231	HIGH	1.92
	LITTLE BLUESTONE	06/11/92	156	NORM	0.76
	LITTLE BLUESTONE	06/25/92 e	*1253	NORM	0.46
	LITTLE BLUESTONE	07/09/92	70	NORM	0.05
	LITTLE BLUESTONE	07/23/92	124	NORM	TRACE
	LITTLE BLUESTONE	08/06/92	15	NORM	0.00
	LITTLE BLUESTONE	08/20/92 e	26	NORM	0.00
	LITTLE BLUESTONE	09/16/92 e	11	LOW	0.00
	CONFLUENCE	04/13/92 e	16	HIGH	0.06
	CONFLUENCE	05/05/92 e	8	NORM	0.09
	CONFLUENCE	05/18/92 e	117	NORM	1.92
	CONFLUENCE	06/11/92	168	HIGH	0.76
	CONFLUENCE	06/25/92	70	NORM	0.46
	CONFLUENCE	07/09/92 e	17	NORM	0.05
	CONFLUENCE	07/23/92	58	NORM	TRACE
	CONFLUENCE	08/06/92 e	15	NORM	0.00
	CONFLUENCE	08/20/92	19	NORM	0.00
	CONFLUENCE	09/16/92	21	HIGH	0.00
	PIPESTEM ST. PARK	04/13/92 e	12	4.9	0.06
	PIPESTEM ST. PARK	05/05/92 e	6	HIGH	0.09
	PIPESTEM ST. PARK	05/18/92 e	150	5.6	1.92
	PIPESTEM ST. PARK	06/11/92	180	HIGH	0.76
	PIPESTEM ST. PARK	06/25/92 e	75	NORM	0.46
	PIPESTEM ST. PARK	07/09/92 e	19	NORM	0.05
	PIPESTEM ST. PARK	07/23/92	54	NORM	TRACE
	PIPESTEM ST. PARK	08/06/92	19	2.5	0.00
	PIPESTEM ST. PARK	08/20/92 e	8	NORM	0.00
	PIPESTEM ST. PARK	09/16/92 e	8	2.2	0.00
	MT. CREEK	04/13/92	6	HIGH	0.06
	MT. CREEK	05/05/92	34	HIGH	0.09
	MT. CREEK	05/18/92 e	124	HIGH	1.92
	MT. CREEK	06/11/92 e	*230	HIGH	0.76
	MT. CREEK	06/25/92 e	*344	NORM	0.46
	MT. CREEK	07/09/92	68	NORM	0.05
	MT. CREEK	07/23/92	78	NORM	TRACE
	MT. CREEK	08/06/92 e	5	NORM	0.00
	MT. CREEK	08/20/92	36	NORM	0.00
	MT. CREEK	09/16/92 e	14	LOW	0.00

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